YOUR COMMODORE

AN ARGUS SPECIALIST PUBLICATION

JANUARY 1988 £1.20

C64 TAPE SYSTEM–FIND PROGRAMS FAST!

ACKROYD'S SAGA–EDUCATIONAL GAME TO TYPE IN ▲
CONTROLLING THE C128's 80 COLUMNS ▲ C64 INPUT SYSTEM

TRILOGIC

A Touch of Magic

the expert WITH ESM

NEW! LOW PRICE

SPECIAL PRICE NOW ONLY £29.99

Complete with V3.1 Software FREE POST

NOW INCLUDING THE LATEST V3.1 SOFTWARE UPGRADE!

IT CAN NOW DO ALL THIS!

1 PROGRAM PARALYSER	Stops even the most HEAVILY PROTECTED PROGRAMS AND DEFEATS ALL "anti-freeze" techniques
2 BACK-UP GENERATOR	TAPE/DISK . DISK/TAPE . DISK/DISK. TAPE/TAPE. Transfers memory resident programs whether loaded from disk or tape.
3 SPRITE EXTRACTOR	Displays the sprites for you to edit, and then save, or RESTART the game using your customised ones. You can view the animation too.
4 SPRITE IMMORTALISER	This feature disables the sprite collision detection — prolongs active sprites .
5 HIRES SCREEN GRABBER	Saves a HIRES screen and then alter it using one of several utilities widely available.
6 CHEAT MACHINE	The easy way to enter cheats and "pokes". Gain extra lives, or infinite energy, etc., etc.
7 CODE INTERROGATOR	A truly professional machine-code monitor, operating over all 64K Ram, with disassemble, compare,, transfer, fill, assemble, hunt, search, mofidy, jump, number conversion, etc. PLUS, B command lists BASIC & R restarts a program.
8 AND IT'S ... THE ONLY PROGRAMMABLE CARTRIDGE	You'll NEVER need to return the cartridge for upgrading - simply send for the latest software - only £2.00 exchange disk or tape. We calculate that you could buy and EXPERT and several upgrages for what it will cost you to upgrade rival products.
9 PRINTER DUMP	Prints out exactly as shown on screen — high & low res. — works with serial printer.
10 EXPERT EXPRESS	Use your EXPERT as a disk turbo cartridge to speed up disk loading.
11 ICON DRIVEN	Operating system improved and even more powerful machine code monitor. Help key. Dual screen facility.

And we haven't forgotten advanced users .....
There is now a 2 Pass Assembler
& Label Generating Disassembler included.

NEW

THE EXPERT UTILITY DISK

- Specific multi-part back-up utilities
- Additional operating systems
- Fast file copier etc. etc.
- Monitor with print command.

ONLY £5.95

ALSO

- SAVES PROGRAMS IN ONE FILE
- COMPACTS PROGRAMS
- RELOADS & DECOMPACTS PROGRAMS WITHIN 35 SECS.
- EXPERT NOT NEEDED FOR RELOADING
- COMPATIBLE WITH ALL CBM 64s & 128 (64MODE)

UPGRADE YOUR EXISTING EXPERT CARTRIDGE

OUR POLICY OF EASY UPGRADABILITY BENEFITS EXISTING USERS AGAIN .

FOR V3.1 SOFTWARE SEND **ONLY £3.50**

STATING WHETHER TAPE OR DISK REQUIRED.,

ALL PRICES INCLUDE VAT AND P&P.

· FAST MAIL ORDER SERVICE · PROMPT DESPATCH
· ALL PRICES FULLY INCLUSIVE PLUS 10 DAY MONEY BACK GUARANTEE ON ALL BACK-UP DEVICES.
PAYMENT BY CASH, CHEQUES PAYABLE TO TRILOGIC BY POSTAL ORDER OR ACCESS. ADD £1 EXTRA FOR EXPORT ORDERS, PAYMENT IN STERLING ONLY PLEASE.

EXPRESS DELIVERY ADD £1.95

Write or 'phone TEL: (0274) 691115.

24 HOUR ANSWER PHONE

Trilogic Dept. Y.C. Unit 1
253B New Works Road
Low Moor, Bradford, BD12 0QP

THE EXPERT AVAILABLE IN EUROPE FROM CAT & KORSH ROTTERDAM 010·311·04507696

this Christmas time!!!

FREE UTILITY DISK!
WORTH £5.95
IF YOU BUY A NEW EXPERT AND RAMBOX TOGETHER!

THE NEW

64k ONLY **£49.95**

RAMBOX
EXPERT RAM PACK

THE NEW V3.1 EXPERT OPERATING SYSTEMS ARE DESIGNED TO USE THESE RAM PACKS TO MAKE THE EXPERT EVEN QUICKER & MORE VERSATILE TO USE.

- 32K OR 64K CAPACITY
- BATTERY BACK-UP BUILT-IN
- CONNECTS TO USER PORT (PAT. APPLIED FOR)
- ADD EXTRA PACKS USING A USER PORT EXPANDER

32k ONLY **£39.95**

The Perfect Partner for Your Expert. (with V3.1)

The EXPERT RAM PACKS are designed for use with the EXPERT cartridge and can be used to store several operating systems thus avoiding the need to load and reprogram disk or tape. They can also be used as general purpose memory packs ('rams disks') using software presently under development so that for example, you could save the current program in a battery back-up version ready for instant use. Another use would be to 'switch' from one program to another at the press of a key.

These ram packs, when combined with the EXPERT make the ideal software developers tool; further developments on this theme will be announced soon.

NEW LOW COST LEADS FROM TRILOGIC

AMIGA PRINT LINK
Don't retire your 64 Serial printer e.g. MPS 801. Trilogic Printlink links your Amiga and old serial printer and uses your 64 as an intelligent printer buffer/interface.
ONLY £29.95
Price includes leads and cartridge Software Package.

AL 1 For TV/Monitors with Euro-socket e.g. Sony
ONLY **£12.95**

AL 2 For Ferguson with DIN Socket
ONLY **£12.99**

AL 3 For CBM 1901 RGBI/16 COLOURS
ONLY **£14.99**

AL 4 For Granada, Hitachi 7 pin DIN.
ONLY **£12.95**

MAKE YOUR TV MONITOR JUST AS GOOD AS THE AMIGA!

CBM 1901 MONITOR 1901 RGB CONVERSION
* FULLY AMIGA COMPATIBLE — ALL 4096 COLOURS.
* ALIDIO SOUND LEAD INCLUDED.
* EXISTING INPUTS RETAINED — INCREASES THE VERSATILITY OF YOUR 1901.

Our conversion makes your 1901 a highly versatile medium res. Colour monitor which can be used with practically all computers, videos etc. – you should never have to buy another colour monitor.

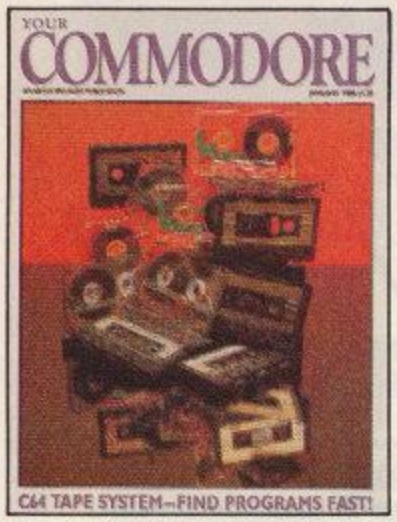
Conversion costs **only £29.95**

inc. carriage add £12.00 for next day delivery.
IMPORTANT Please send the monitor by insured post or DATAPOST.
PLEASE PHONE FOR NEXT DAY DELIVERY

TRILOGIC

STOP PRESS!

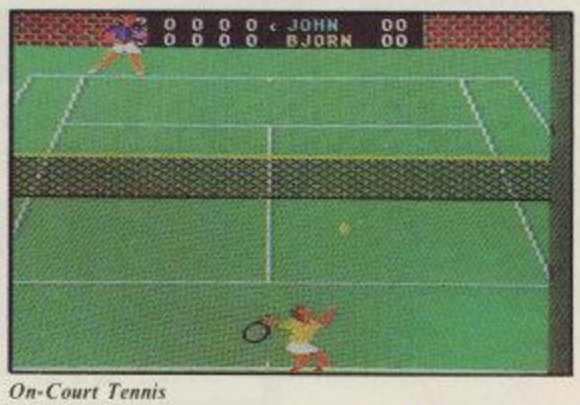
LEADS ALSO AVAILABLE FOR ATARI!



REGULARS

		C64	C16	C128	+4
• *Data Statements*	6				
• *Game of the Month*	10				
Solid Gold					
• *Byting into the 6510*	13	●		●	
Learn how to add an interrupt driven cursor to our typewriter program					
• *Sprite Library*	32	●		●	
This month we look at sprites in the form of vehicles					
• *Bothersome Basic*	36	●	●	●	●
Continuing our series, this month we look at the INPUT command					
• *Games Reviews*	41				
• *Teacher's Pet*	47				
• *Competition*	50				
Your chance to win the revised Konix joystick					
• *Software for Sale*	63				
• *Listings*	75				
• *Back Page*	106				

Above: Infiltrator. Below: Winter Games



On-Court Tennis

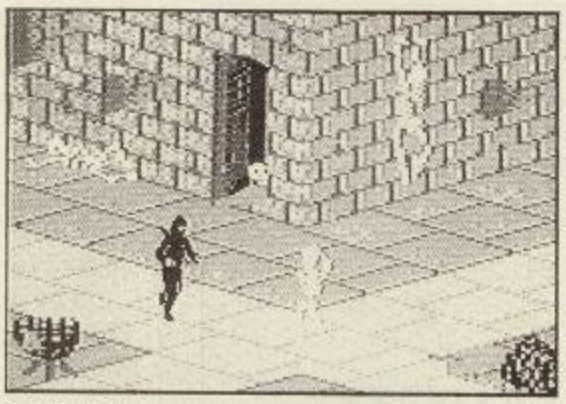
Editor: Stuart Cooke
Assistant Editor: Sue Joyce
Advertisement Manager: Stuart Taylor
Advertisement Copy Control: Laura Champion
Origination: Ebony Typesetting
Design: Argus Design Studio

Your Commodore incorporating Your 64 is a monthly magazine appearing on the first Friday of each month. Your Amiga is published every second month within the pages of Your Commodore. Argus Specialist Publications Limited Editorial & Advertisement Office, Your Commodore, No 1 Golden Square, London W1R 3AB. Telephone: 01-437 0626 Telex: 8811896.
Subscription rates upon application to Your Commodore Subscriptions Department, Infonet Ltd, 5 River Park Estate, Berkhamsted, Herts, HP4 1HL.

ABC
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

FEATURES

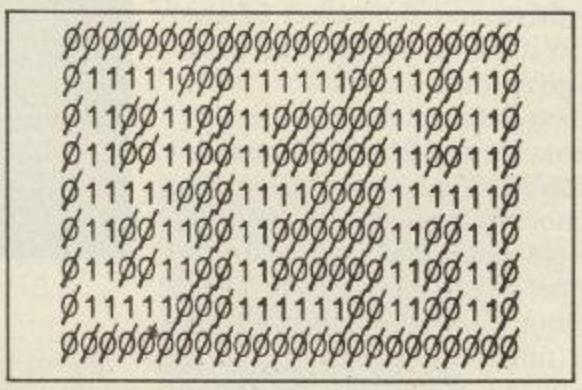
		C64	C16	C128	+4
• ***BobsTerm Pro***	**29**	●		●	
Could this be the ultimate communications package?					
• ***Best Buys of 1987***	**71**				
The best games from '87					
• ***Ackroyd's Saga***	**39**	●		●	
Learning tables with your computer					
• ***Enlarging the C64***	**53**	●		●	
Produce enlarged characters by creating User Definable Graphics					



The Last Ninja

UTILITIES

		C64	C16	C128	+4
• ***80 Character Printout***	**16**				
Produce 80 columns per line with your C64					
• ***Controlling the 80 Column***					
• ***Video Display***	**18**				
Learn about the capabilities and limitations of VDC					
• ***Questionnaire 1***	**21**	●		●	
Test the IQ of your friends with this fun program					
• ***May I Interrupt?***	**23**	●		●	
Discover the world of interrupts					
• ***Array Display Subroutines***	**61**	●		●	
Create a screen input and display routine which acts on string arrays					
• ***C64 Tape System***	**68**			●	
Provide a menu driven access to multi-program library					



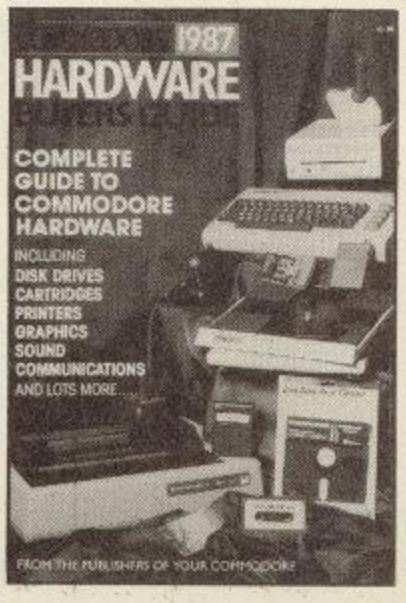
Base Characters

VOLUME 4 NUMBER 4

The contents of this publication including all articles, designs, drawings and programs and all copyright and other intellectual property rights therein belong to Argus Specialist Publications Limited. All rights conferred by the Law of Copyright and other intellectual property rights and by virtue of international copyright conventions are specifically reserved to Argus Specialist Publications Limited and any reproduction requires the prior written consent of the Company. ©1987. Distribution SM Distribution, 16-18 Trinity Gardens, London SW9 8DX. Printed by Chase Web, Plymouth. Opinions expressed in reviews are the opinions of the reviewers and not necessarily those of the magazine. While every effort is made to thoroughly check programs published for errors we cannot be held responsible for any errors that do occur.

ARGUS PRESS GROUP

OUT NOW!



DATA STATEMENTS

YES
PRIME MINISTER
THE COMPUTER GAME

STRICTLY CONFIDENTIAL
COMPUTER USERS ONLY

Television Tie-ins

There has been a sudden spurt of TV related titles in the last few weeks.

First, Mosaic Publishing is launching *Yes Prime Minister*, a game launched on one of the most popular comedy programs of recent years.

The player takes the part of Jim Hacker and must raise his standing in the polls during five days of turmoil and crises.

The game is available on C64 cassette at £14.95 and disk at £19.95.

TV games, Domark's new label, has announced the launch of three new titles for the C64. All based on popular television shows, the games are *Countdown, Bullseye* and *Treasure Hunt*, and all feature many of the familiar aspects of their counterparts on the box. All will cost £7.95.

Touchline:
Mosaic: *Gorley Firs, South Gorley, Fordingbridge, Hants SP6 2PS.* ***Tel:*** *0425 57055.*
Domark: *Domark House, 22 Hartfield Road, Wimbledon, London SW19 3TA.* ***Tel:*** *01 947 5622.*

Sport for All

Electronic Arts has recently released a whole host of sports games for the C64, so here's a quick run down of what's available.

Skate or Die is on C64 cassette (£9.95) and disk (£14.95). It's a skateboard simulation in which you have to compete in five different competitions. The contests re modelled on real championships and feature events like Ramp Freestyle, Downhill Race and Ramp Hill Jump.

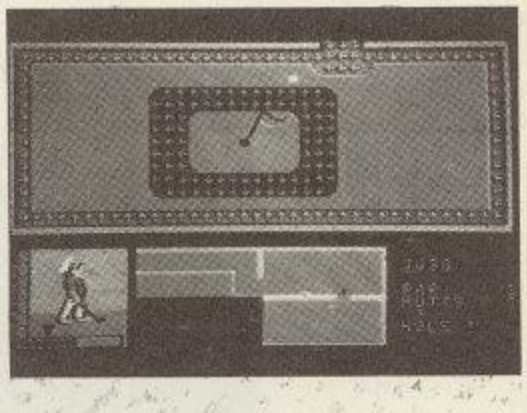
Mini-Putt for the C64 (cassette £9.95 and disk (£14.95) is a crazy golf game in which nothing is as it seems. A smooth green can suddenly come to life and gobble your golf ball!

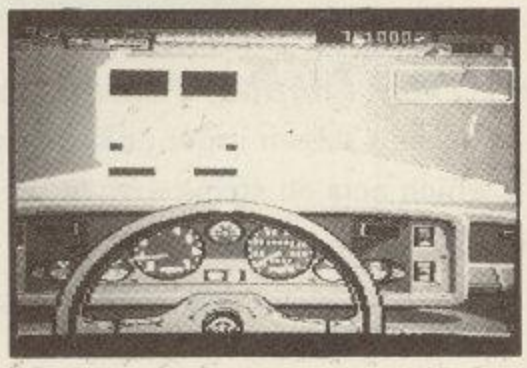
Test Drive is a driving simulation which lets you experience the thrill of driving some of the world's top cars including a Ferrari Testarossa and a Lamborghini Countach. The simulation displays the interior of the car and the road to give the feel of a real test drive and the object of the game is to drive sections of the road within a given time limit.

Test Drive is available for the C64 at £9.95 cassette and £14.95 disk and is also out on the Amiga at £24.95.

Commodore has announced the release of an Amiga *Sports Pack* and a Commodore 64 *Sports Pack*. Each pack contains an assortment of sports games, a full size canvas bag and a 'Win a day at Chelsea' competition.

Touchline:
Electronic Arts: *Langley Business Centre, 11-49 Station Road, Langley, nr Slough, berks, S13 8YN.* ***Tel:*** *0753 49442.*
Commodore: *Commodore House, The Switchback, Gardner Road, Maidenhead, Berks SL6 7XA.* ***Tel:*** *0628 770088.*





DATA STATEMENTS

Generally Speaking

The UK's first Technology Graduate Recruitment fair is to be held at the Novotel, Hammersmith 8-9 January 1988.

Chris Boon, of organisers Intro UK, said: "Since launching the fair, we have been very pleased by the initial take up of stands." Companies committed to appearing include Barclays' Bank, TSB, Dow Chemical, Thames Water Authority and Rank Xerox.

Exhibitors are hoping to attract graduates with technology and computing backgrounds at the specialist event.

Also relevant to those interested in computers, is the Data Protection Act 1984. The final elements of the Act came into force in November and will affect everyone in the UK.

For the first time, every man, woman and child has the legal right to see what is held on computer files about themselves and where appropriate to have the information corrected. It also gives individual the right to compensation under certain circumstances.

Lives can be seriously affected if inaccurate data is held about individuals. For instance, credit worthiness could be undermined or employment prospects blocked.

For further information about the Act and your rights under it, contact the Office of the Data Protection Registrar at the address in Touchline.

Touchline:

Intro UK: *Crays Pond House, Crays Pond, Reading, Berks, RG8 7QG.* ***Tel:*** *0491 681010.*

Office of the Data Protection Registrar: *Springfield House, Water Lane, Wilmslow, Cheshire SK9 5AX.* ***Tel:*** *0625 535711.*

In the Arcade

Domark, always on the lookout for big licensing deals, has just released a C64 version of *Star Wars*. The game is a conversion from the original licensed Atari coin-op game and bears a close resemblance to it.

You select your own difficulty level and then you're placed in charge of an X-wing fighter and are ready to fight the forces of the evil Darth Vader. The C64 cassette version is £9.95, and the disk version is £19.95.

Amiga News

The Amiga 500 has been reduced in price by Commodore to £499.99 including VAT. The announcement came recently after weeks of speculation over the pricing of the Amiga 500, the smallest machine in the Amiga range.

Boxed with the computer, and inclusive in the price, are *Deluxe Paint* from Electronic Arts and *The Very First* tutorial pack.

Tom Hart, National Sales Manager Consumer Products Division, said: "We believe that £499.99 inclusive of VAT offers a significant incentive to the consumer during the Christmas period and the months ahead. This is the only price change both are for the remainder of 1987 and for the forseeable future."

Software is still being launched thick and fast for the Amiga range, a large percentage coming from US companies. Electronic Arts is no exception, having recently announced the arrival of four new Amiga products.

Three of these are musical. *Instant Music* (£24.95) allows even a novice to compose and play impressive sounding pieces. The program uses a non-standard form of musical notation which, it is claimed by EA, is exceptionally easy to read and a remarkable user interface to make creating music as easy as possible. Nor will *Instant Music* ever let the user play out of tune or out of rhythm.

The two other musical products are library disks to accompany *Instant Music*. These are: *It's Only Roack 'N Roll* and *Hot and Cool Jazz*. Both will retail at £9.99.

The fourth EA Amiga release is *Earl Weaver Baseball* a sports simulation co-written by two top baseball managers Earl Weaver and Eddie Drombrower.

The arcade mode of the game is a challenging sophisticated simualtion which features high resolution graphics and realistic digitised sound. However, there is a major strategic element to the game, in that players can step into the manager's shoes to set line-ups, trade and draft players, yank pitchers and outwit a variety of opponents including Earl WEaver himself. Players also get the chance to design their own baseball park. The game is priced at £24.95.

Sentinel Software has announced a price reduction for the *Word Perfect Amiga* word processor. Formerly £255, the program will now sell at £199.

Sentinel is also continuing its trade in offer to *Scribble* owners. Anyone currently using *Scribble* can obtain a £50 refund off the cost of *Word Perfect Amiga*. Simply send your old master disks and manual with a copy of your invoice for *Word Perfect Amiga* to Sentinel Software at the address in Touchline and you will get a £50 refund.

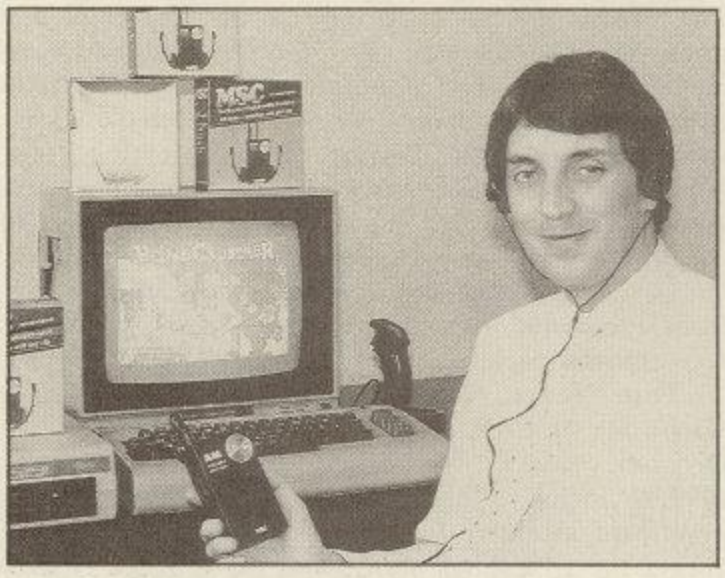
Touchline:

Commodore: *Commodore House, The Switchback, Gardner Road, Maidenhead, berks, SL6 7XA.* ***Tel:*** *0628 770088.*

Electronic Arts: *Langley Business Centre, 11-49 Station Road, Langley, Near Slough, Berks SL3 8YN.* ***Tel:*** *0753 49442.*

Sentinel Software: *Wellington House, New Zealand Avenue, Walton-on-Thames, Surrey KT121PY.* ***Tel:*** *0932 231164.*

DATA STATEMENTS



Richard Hanson, Managing Director of Superior Software gets to grips with Bonecruncher.

Domark is also planning future games based on the films *The Empire Strikes Back* and *The Return of the Jedi*.

Octapolis is a new arcade game from English Software. Set in the year 3987 the small planet of Octapolis is faced with the might of the Imperium. Luckily a secret weapon is available, enormous mental power. No enemy ship could approach and expect its crew to remain sane and sensible.

However the Imperium secret service has been trying to find a space pilot who would penetrate the zone around the planet and find a way through, so that Octapolis could be wiped ut. Now a hero has been found and it's you.

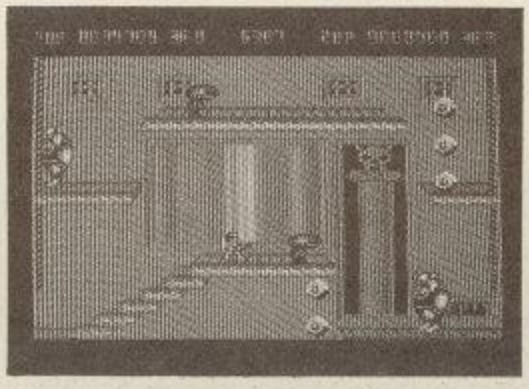
Game features include split screen two way perspective scrolling, 40 detailed play areas and sound effects to match. It costs £9.95 for C64 cassette and £12.95 for the disk.

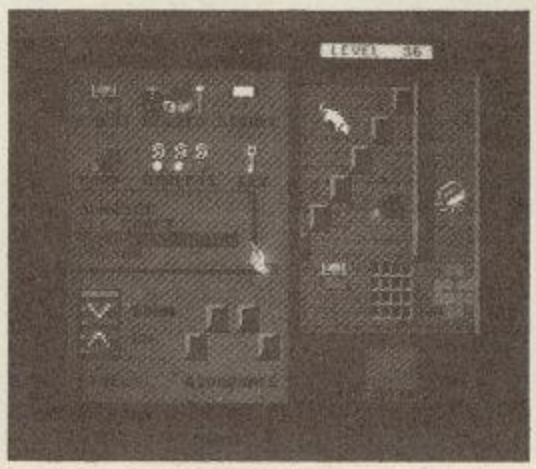
Imagine has released *Freddie Hardset*, an arcade action game for the C64 (£8.95 cassette and £12.95 disk). The game originated from Spanish software house Dinamic.

Freddie Hardset is a counter-espionage agent, skilled in martial arts and laser weaponry. However, Freddie habitually drinks too much and one night manages to crash his space ship on an enemy planet. The only way he can escape is to hi-jack an enemy space ship without being killed by human-reptile mutants, immune to laser fire.

Mirrorsoft has released a new Tony Crowther game for the C64 on disk (£12.95) and tape (£9.95). The game is called *Zig Zag* and is set in the twelfth dimension. As a trainee space pilot, you must face the ultimate challenge, the Matrix of Zog. Created to find the supreme space pilot, it has yet to fulfil its purpose. Your aim is to find the eight crystals of Zog and escape to what lies beyond the Matrix.

As an incentive to would-be super-pilots, Mirrorsoft is offering a ghetto-blaster signed by Tony Crowther to the first five players who finish and discover the code on the hi-score table.





Superior Software is also offering prizes to accomplished games players. *Bonecruncher* is Superior's new arcade adventure for the C64 (£9.95 cassette and £11.95 disk) and the Amiga (£14.95). Bono is a baby dragon who runs a bath house in the depths of the sea for monsters fed up of stagnant water. Unfortunately, the baths attract some undesirables who love to eat baby dragon meat.

The competition can be won by anyone who finished the game. Each player who completes *Bonecruncher* successfully can claim a portable radio complete with headphone, a Bono badge and a winner's certificate.

In *Out of this World*, on the Reaktor label, you (Chuck Harison) and your C64 (an RP2-16 fighter jet) find yourselves in The Other World and have to negotiate eight levels, seven bonus levels and hostile enemy ships in order to make the enemy surrender. The game is available on cassette and disk at £9.99 and £12.99.

Electronic Arts has launched *Demon Stalker*, a one or two player arcade game for the C64.

Demon Stalker contains 99 levels of amazing mazes, all with different goals, messages, monsters and magic. And level 100 contains Calcrak the Demon, ready to battle with unwanted intruders. On each level are many useful items but you have no way of knowing if they are good or evil so be prepared to take risks. The cassette version of the game is £9.95 and the disk version costs £14.95.

Touchline:

Domark: *Domark House, 22 Hartfield Road, Wimbledon, London SW19 3TA.* ***Tel:*** *01-947 5622*

English Software: *1 North Parade, Parsonage Gardens, Manchester M3 2NH.* ***Tel:*** *061 835 1358.*

Imagine: *6 Central Street, Manchester M2 5NS.* ***Tel:*** *061 834 3939*

Mirrorsoft: *Athene House, 66-73 Shoe Lane, London EC4P 4AB.* ***Tel:*** *01 377 4837.*

Superior Software: *Regent House, Skinner Lane, Leeds, LS7 1AX.* ***Tel:*** *0532 459453.*

Reaktor: *9 Disraeli Road, Putney, London SW15 2DR.* ***Tel:*** *01-785 4283.*

Electronic Arts: *Langley Business Centre, 11-49 Station Road, Langley, Nr Slough, Berkshire SL3 8YN.* ***Tel:*** *0753 49442.*

DIMENSION computers l.t.d.

27/29 High Street
Leicester LE1 4FP
Tel: (0533)
517479/21874

THE MIDLAND'S LARGEST COMPUTER STORE

CBM 64/128 and PLUS 4 COMPANIES PACK
Sales/Purchase/Nominal Ledgers with Invoicing and Stock Control, Disc **£24.95**
"Very easy to use — probably the friendliest package I have come across."
— Commodore User

VIZA

Vizastar XL8 64	~~£99.95~~	£79.95
Vizastar XL8 128	~~£129.95~~	£99.95
Vizawrite Classic 128	~~£99.95~~	£79.95

PRECISION

Superscript 64	~~£60.95~~	£49.95
Superbase 64/+4	~~£90.95~~	£39.95
Superscript 64 & Superbase 64	~~£169.90~~	£79.95
Superscript 128	~~£89.95~~	£74.95
Superbase 128	~~£99.95~~	£59.95
Superscript 128 & Superbase 128	~~£189.90~~	£119.95
Superbase, The Book		£11.95

GEOS
CBM 64/128 Operating System Including: Desktop, Geowrite, Geopaint, and Desk Accessories, Disc **£49.95**

GEOFILE
Geos Based Filing System, Disc **£37.50**

COMMODORE 128 COMPENDIUM PACK
Commodore 128 Computer, C2N Data Recorder, Music Maker Keyboard, Spirit of the Stones, Jack Attack and International Soccer Software **£269.95**

AMIGA RANGE

AMIGA A500/CBM MONITOR OFFER
AMIGA A500 with **COMMODORE 1081 HIGH RES COLOUR MONITOR**, Mouse, Workbench, Basic and DPAINT Software **£749.95**

AMIGA A500 PACK 1
with Mouse, Workbench, Basic, DPAINT, TV Modulator, 40 Disc Storage Box, Dust Cover and 10 Games/Utility Discs **£458.85**

AMIGA A500 PACK 3
with Mouse, Workbench, Basic and DPAINT Software **£429.95**

PHILIPS COLOUR TV TUNER
For use with any Composite Monitor **£78.95**

AMIGA 1Mb 2nd Drive **£129.95**

AMIGA A2000 SYSTEM

AMIGA A2000 COMPUTER with **COMMODORE 1081 HIGH RES COLOUR MONITOR**
Including 1 year on-site maintenance . **£1259.00**

PHILIPS 8833 COLOUR MONITOR
High Res with Stereo Sound Output **£279.95**

AMIGA A500
Upgrade to 1 Mb **£113.00**

AMIGA A500/8833 MONITOR OFFER
AMIGA A500 with **PHILIPS 8833 HIGH RES COLOUR MONITOR** with STEREO SOUND OUTPUT, Mouse, Workbench, Basic and DPAINT Software **£699.95**

COMMODORE 1081 HIGH RES MONITOR **£329.95**

AMIGA A500 PACK 2
with Mouse, Workbench, Basic, DPAINT, Sports Bag with Baseball, Golf and Football, 40 Disc Storage Box, Dust Cover and 10 Games/Utility Discs **£489.95**

OLIVETTI DM105
COLOUR DOT MATRIX PRINTER
Unbeatable on price/performance, the Olivetti DM105 offers the following features:
- ★ Will faithfully reproduce any AMIGA screen
- ★ 120 cps Draft, 25 cps Near Letter Quality Modes
- ★ Prints NLQ, Draft and Graphics in Full Colour
- ★ Up to 240 Dots Per Inch Graphic Resolution
- ★ Full AMIGA Compatibility
- ★ Supported by All Software ..... ~~£412.85~~ **£199.95**

Optional Tractor Feed Unit **£34.50**

1541C DISC DRIVE **£169.95**
1571 DISC DRIVE **£229.95**
The above include 10 Discs, plus either:
Software Pack A
6 Adventure Games plus 5 Disc Arcade Games;
Software Pack B
Quick Brown Fox Wordprocessor, Easyfile Database, and Future Finance Planning Package

OCEANIC OC 118N
Commodore Compatible Disc Drive
- ★ Fast, Quiet Operation ★ 174K Storage
- ★ Sturdy Slimline Construction ★ Fully C64/128 Compatible
- ★ External Power Supply Eliminates Heat Build-Up
- ★ Durable, Reliable Operation **£139.95**

Including either:
Software Pack A
6 Disc Adventure Games plus 5 Disc Arcade Games
Software Pack B
Quick Brown Fox Wordprocessor, Easyfile Database, and Future Finance Planning Package

COMMODORE 560P
2-colour Dot Matrix Printer, takes 2⅜in. roll paper ..... ~~£49.95~~ **£29.95**

MPS803 TRACTOR FEED UNIT **£29.95**

CBM 64/128 MUSIC EXPANSION SYSTEM
Including Keyboard, Synthesiser and Software **£99.95**

COMPOSER/EDITOR SOFTWARE
For Music Expansion System, Tape or Disc **£24.95**

ACTION REPLAY Mk III
Tape to Disc Back-up Cartridge **£29.95**

NEOS MOUSE
WITH CHEESE SOFTWARE, Tape or Disc **£24.95**

COMMODORE C2N DATA RECORDER **£29.95**

BLAZING PADDLES
Lightpen/Graphics Illustrator Package, Tape or Disc **£24.95**
"Powerful, well designed — a really sophisticated graphics package"
— Your Commodore

PRINTER RIBBON OFFER

MPS 801, 802 Ribbons	£5.95
MPS 803 & MPS 1000	£4.95
DPS 1101 Multi Strike	£3.50

BUY FOUR AND GET ONE FREE!

CITIZEN 120D CBM PRINTER
High Quality Dot Matrix Printer
★ Near Letter Quality Mode ★ 120 cps Draft Print Mode
★ Friction and Tractor Feed ★ Needs no interface
★ Full Two-Year Warranty ★ 100% Commodore compatible
Commodore Version (with CBM64/128 Printer Lead) **£169.95**
Centronics Version (with Amiga Printer Lead) **£179.95**

STAR NL10 Dot Matrix Printer
Commodore Version (with CBM64/128 Printer Lead) **£219.95**
Centronics Version (with Amiga Printer Lead) **£229.95**

Commodore 1571 Double-sided Drive	£219.95
Commodore 1901 Colour Monitor	£219.95
Philips 64/128 Green Screen Monitor	£89.95
Commodore 1541C Disc Drive	£159.95
Commodore 128D	£399.95
Commodore MPS 1000 CBM/Centronics Printer	£229.95
Commodore 128 Computer	£199.95
Commodore DPS 1101 Daisy Wheel Printer	£199.95

PERSONAL CALLERS AND EXPORT ENQUIRIES WELCOME
ALL OFFERS STRICTLY SUBJECT TO AVAILABILITY
ALL PRICES INCLUDE V.A.T. UNLESS OTHERWISE STATED

To order, either send cheque/P.O. with coupon or ring **(0533) 517479/21874** with Access/Barclaycard number. Please allow 7 working days for delivery from receipt of order or cheque clearance.
Please add £1.00 towards carriage and packing on any software order.
Hardware orders add £1.00 under £65.00 value, and £5.00 over £65.00 value.
Printer orders add £5.00 towards carriage.

Send to: Dept. No. YC 1, Dimension Computers Ltd., 27/29 High Street, Leicester LE1 4FP.
Tel: (0533) 517479/21874 Fax: (0533) 511638

Item	Quantity	Price
	Total	

Name .....
Address .....
.....
Telephone: .....

Solid Gold

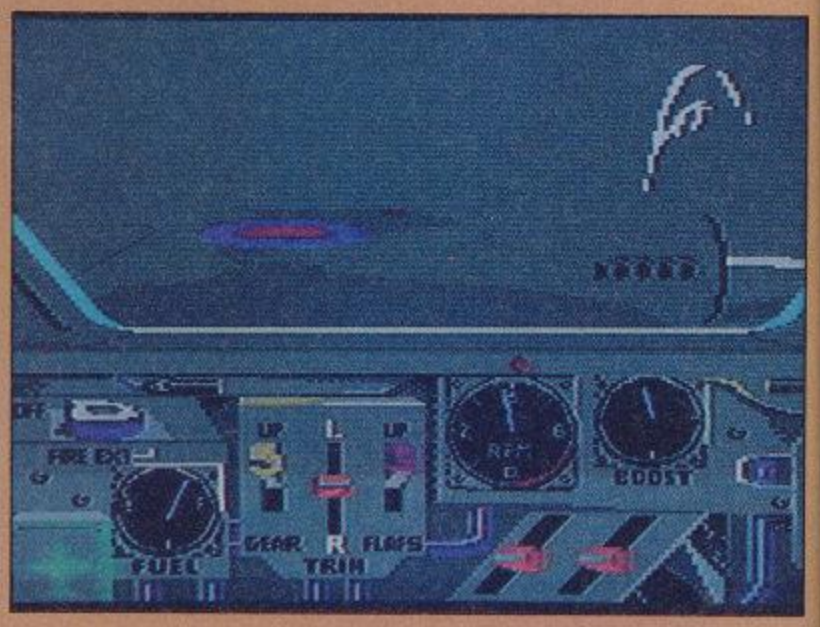
Go for gold in the latest in game compilations.

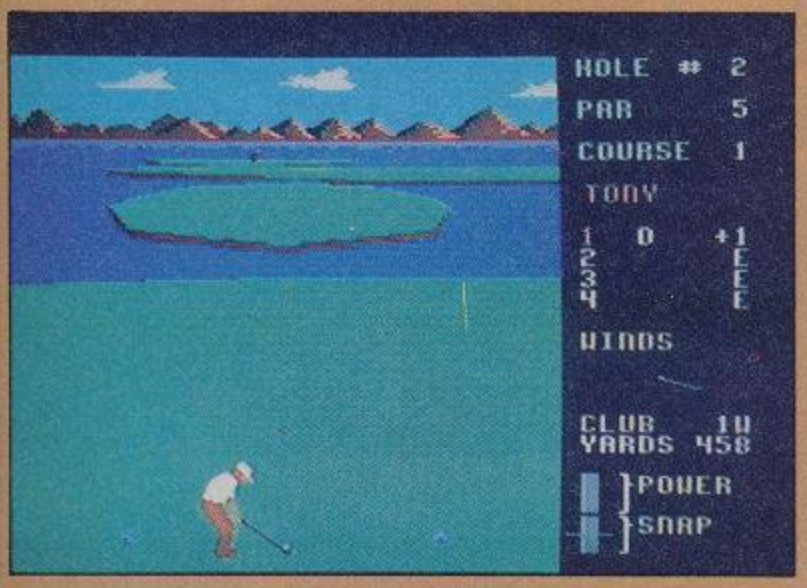
By Tony Hetherington

Compilations come and go and offer you a gaggle of goodies for the price of one game. They usually consist of one chart topper, two also rans and a few lemons. So the usual advice from reviewers is to buy it if you haven't aready got the good game. Now US Gold has changed all that with Solid Gold, a compilation of five great games. Now the advice is simple – buy it!

Gauntlet leads the impressive line-up that also includes the combat flight simulator Ace of Aces, the original version of Leader Board, the best of the "event" sports games, Winter Games, and Infiltrator which is a flight simulator, commando game and arcade adventure all rolled into one.

Gauntlet took the covetted Christmas number one spot and is the conversion of the classic coin-op machine that was so popular that a slot for £1 coins was specially fitted to so players could cram in their money. The C64 version captured the excitement of the battles of a warrior,





wizard, elf and valkirie (two at at time) against ghosts, grunts, robbers, sorcerers and the aptly named deaths as they bravely delve deeper into the dungeon.

A staggering 512 levels packed with monsters and mayhem lay ahead as they search for treasure, keys to open doors, magic potions, amulets of invisibility and food to top up their health points. As monsters munch you and poisons drain you then the health points are lost. Run out of health points and you run out of game.

Gauntlet is a fast and furious game that's played in a state of semi-controlled panic by players that once bitten, are hooked for hours and hours. Unbdoubtedly, the pick of the coin-op conversions.

Ace of Aces takes you to the skies in the pilot seat of a Mosquito fighter bomber. The game begins in the briefing room where you can choose to bomb a POW train carrying prisoners to Berlin, attack submarines before they escape to the open sea, deflect V1 rockets from their deadly course to London or dogfight with a squadron of 109's. If you want to become the Ace of Aces you will have to attempt all four at once!

Once airborne you certainly have your work cut out as you have to plot your course to that target, control both engines, select between guns, rockets and bomb weapons and fight off attacking ME109's.

Leader Board was the first of a series of four golf games from Access, the peopie who brought you subtle games such as the screaming Beach Head II and Raid over Moscow. Despite the lack of chaos and killing (the normal Access trademarks) the Leader Board courses can be viscious particularly to novice golfers.

Unlike other golf simulations that pontificate over club selection and fine angles Leader Board is a LOAD and go game.

Hit and Hope tactics seem to work as well as any other which makes it a real games players game which probably explains why it shot straight into the number spot in the charts.

The courses are a bit limited and consist of islands set in a massive lake so if you manage to stay out of the drink you'll probably get a good score. If you enjoy Leader Board then it's probably worth investing in one of its three sequels. Leader Board Tournament added four new but equally wet courses, the Executive version dried out the course and added trees and bunkers and finally World Class Leader Board is the definitive version complete with a top down map of each hole.

Winter Games was the third in the Epyx "Games" series that began with Summer Games 1 and 2 and has since continued with World Games and recently California Games. Winter Games, another chart topper, is still my favourite.

Gruelling events push joystick atheltes to their limits as they go for gold in the ice and snow.

Superb graphics form the backdrop for events such as the ski jump and bobsled as well as the curious Hot Dog Ariels in which contenders must perform acrobatics while leaping off a ski slope! Skating comes in the three varieties of speed, figure and free but the most gruelling event has got to be the biathlon. This is a cross crountry race against time in which you must also shoot targets to get a good score and a chance of a medal. After the biathlon, the 1500m will be easy.

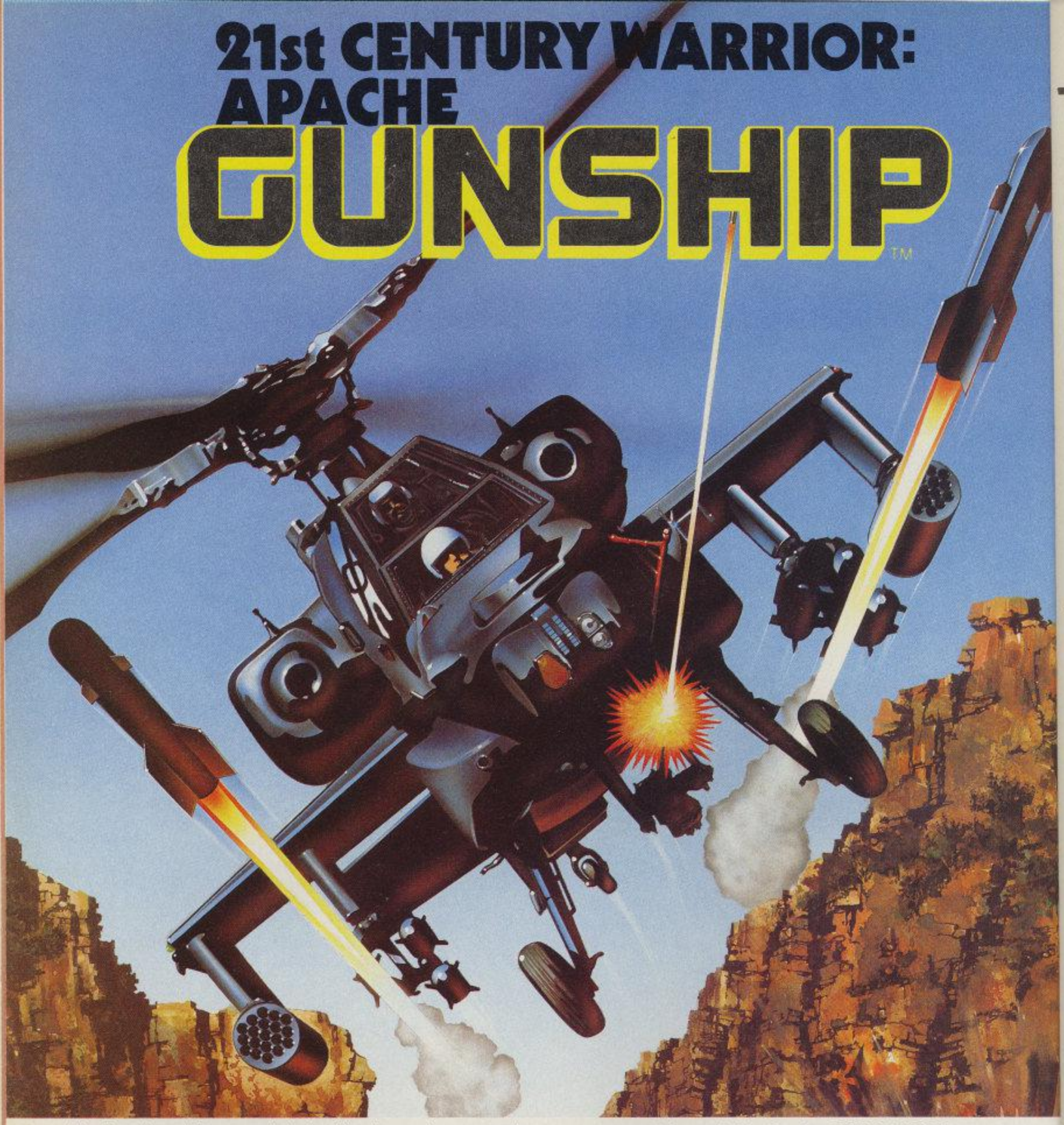
Last but no means least **Infiltrator** casts you as Johny "Jimbo-Baby" McGibbets as you set off in your super helicopter to save the world once again. This time the Mad Leader is up to his old tricks again and you must stop him.

In the first of three missions you must fly your Whizbang Enterprises Gizmo Attack helicopter through enemy airspace then land and infiltrate the enemies base. With only your usual toolkit of sleeping gas, false papers and gas grenades you must search the base and photograph the Mad Leader's plans and then escape back to base. This mission leads you through a combat simulator to a commando style arcade adventure and back again in one amazing game.

Each of these games is a classic in its right but together for only £9.99 they are pure solid gold.

Touchline:
Title: *Solid Gold.* ***Supplier:*** *US Gold, 2/3 Holford Way, Holford, Birmingham B6 7AX.* ***Tel:*** *021-356 3388.* ***Machine:*** *C64.* ***Price:*** *£9.99 cass/£14.99 disk.*
Originality: *4/10.* ***Playability:*** *10/10.* ***Graphics:*** *9/10.* ***Value:*** *11/10.*

21st CENTURY WARRIOR: APACHE GUNSHIP™



The Apache . . . Fierce and elusive, like its warrior namesake . . . Capable of defeating enemy tanks, infantry, and hostile aircraft on the modern electronic battlefield.
Gunship's revolutionary 3-D graphics enable you, the pilot, to fly into the world's hottest trouble spots . . .You'll use an unbelievable array of high tech information and weapon systems, including lasers, video cameras, night viewers, radar warnings, jammers, computers, missiles, rockets, flares and a 30mm cannon! Successful missions will be rewarded with medals and rank promotions.

GUNSHIP is available for the CBM 64/128K, Spectrum and coming soon for IBM PC and compatibles.

MICRO PROSE
SIMULATION • SOFTWARE

Please send _____ copy/ies of Gunship CBM 64/128 ☐ Cassette £14.95 ☐ Disk £19.95.
Spectrum ☐ Cassette £9.95 ☐ Disk £12.95 ☐ Further details.
Name (block capitals)_____ Address_____
_____ Post Code_____
I enclose £_____ including 55p P+P. Cheques payable to MicroProse Software Ltd.
or debit my Access/Visa card. Expiry date_____ No. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

MicroProse Ltd., 2 Market Place, Tetbury, Gloucestershire GL8 8DA, UK. Tel: (0666) 54326. Tlx: 43422 MPS/UKG

Byting into the 6510

This month we continue our typewriter program in machine code by adding an interrupt driven cursor and find out more about the machine stack.

By Burghard-Henry Lehman

Personally, I consider the most exciting thing about computers is their tremendous flexibility. Even though they are only machines, they are the most versatile kind ever invented. This opens the way for unlimited creativity, and at the end of the day, a computer is as good as what you make of it.

For example, you may be forgiven for thinking that since you bought yourself a Commodore 64 you are lumbered with a slow and pretty limited Basic for ever. But the moment you learn something about how flexible the machine really is, you'll find that this is only the tip of the iceberg. The deeper you get into the C64, the more you will discover that it has been designed in ways which literally beg you to make more out of it. In the end you could change your computer so completely that you could have a brand new computer every week! And this is not really as difficult as you might think. In fact, the designers of the C64 made sure of that in several ways.

In the following article we will discover a powerful way of changing your C64 considering the use of vectors.

Vectors

In the last article in this series I told you a little about the maskable interrupt which is called upon every 60th of a second and enables the computer to read the keyboard and print the flashing cursor. Now we want to use this knowledge and create our own cursor.

First of all, let's look at exactly what hapens every 60th of a second.

Each time the interrupt is called the microprocessor is made to jump to the last location of the C64 which is hex FFFE or decimal 65535. Actually, it's not really jumping to this address, but using this uppermost location to find out where to jump to next. (You might like to know that all processors of the 6502 family, to which the 6510 belongs, are programmed to read the vector at $FFFE. But from there all machines take different routes).

So this is what a "vector" is all about. It is very similar to what we have already learned when dealing with indirect addressing – the contents of two locations point the microprocessor to the address of another location.

The vector at the top of the C64 tells the 6510 to jump to a routine at hex FF48, decimal 65352. This is the start of the interrupt routine and begins with the 6510 saving the contents of all its registers and so afterwards, it can continue with whatever it was doing before. It is then made to jump via another vector.

This vector is located in RAM, at hex 0314 or decimal 782, and is the one which interests us most. Because it is located in RAM we can change it and thus make the 6510 jump to our routine, instead of the usual routine in ROM.

Driving a Wedge

Vectors are very useful because they permit flexibility in the design of a micro. When a computer first comes onto the market the operating system is seldom as fully developed as hoped. There are very often bugs present (the people who program the operating system are just as fallible as the rest of us...). It is also very likely that the designer comes up with ideas for improved facilities.

Without vectors those changes in the operating system would mean that the whole program would have to be re-written completely. It would also mean that some of the hardware of the computer might have to be re-designed and this would result in a lot of very unhappy people who have spent their hard-earned money on a brand new micro, only to find themselves within a very short time lumbered with a machine which is hopelessly out of date. This problem can be solved by using vectors which are fixed locations, either in RAM or in ROM. All that has to be changed now is the contents of the vector location, which makes the microprocessor jump to the new or modified routine.

Vectors are also very useful to the humble programmer. If a vector is in RAM, he can change it and make the microprocessor jump to his routine instead of the one in the operating system. This is called "driving a wedge", and is used by all the extended Basic programs available for the C64.

We will also use this method, for programming our own cursor.

Turning the Cursor On

The interrupt routine which I have run into a separate source file (located at 50000 – see listing 2) consists of three routines:

- the routine, which turns our cursor on.
- the routine, which turns it off.

• the interrupt routine itself, which is called upon every 60th of a second via the vector at $0314.

"Turning the cursor on" could sound a little misleading, as we don't infact turn anything on or off. All we do is change the vector at $0314. But for our purpose this means, that from then on our cursor is "turned on", in the sense that the computer will now jump to our routine instead of the one in Kernal-ROM which is located at $EA31.

Later on, when we "turn the cursor off", we will do the opposite, i.e. change the vector back to normal.

As you can see from lines 150 and 250 (and 330 and 380, respectively), I have introduced two new op-code mnemonics: "SEI" and "CLI". You may remember that in the last article I said that we are dealing with a "maskable interrupt", that is an interrupt which can be turned on and off by software.

This is exactly what "SEI" and "CLI" do: "SEI", which stands for "SEt Interrupt flag", disables the interrupt. "CLI", which stands for "CLear Interrupt flag", enables it. The interrupt flag is bit 3 of the flag register of the 6510. If this flag is clear (0), the microprocessor executes the interrupt every 60th of a second. If it is set (1), it doesn't.

It is very important to disable the interrupt while we make the 6510 change the vector. Remember, in the time which it takes you to read lines 160 to 190 in our program listing, the 6510 will have called the interrupt at least sixty times! So it could easily change part of the vector at $0314 and then jump to the interrupt, using the same vector which it has just partially changed. This would result of course in it jumping to somewhere quite nonsensical! And this, in all likelihood, will mean a complete crash!

So we have to prevent the 6510 from following the interrupt while it is changing the vector.

In lines 210 to 230 I zero the two variables ("CURSFLAG" and "COUNT"), which will be used in the interrupt routine itself. More about this in a minute.

Flashing the Cursor

What does "flashing the cursor" mean? (and I am not thinking of the possible naughty connotations...)

In slow motion it means that there are two states in which a certain position on the screen can be: in the normal C64 mode you either have the character at that position printed normally or in reverse. The flashing effect comes from the machine alternating between these two states.

What happens is very simple – some of the time the interrupt is called, it prints the character in normal, while the rest of the time it prints it in reverse.

If it alternated between these two every 60th of a second, it would happen so quickly that you wouldn't be able to see the cursor. All you would get at that position is a bad case of flicker.

Therefore we have to introduce a timing device to make it alternate about once a second. This is what the variable "COUNT" is all about, which I introduced in lines 210-230. (Of course, by changing the value in "COUNT" you could easily change the timespan to suit your taste!)

It starts off with "COUNT" = 0. And every time the interrupt is called, this is bumped up by one (line 580). Then it is loaded into the accumulator and compared with 20 (lines 580-610). If it doesn't equal 20, the program exits straight away to line 980 (JMP $EA7B makes it jump to the rest of the normal interrupt routine in the Kernal, which makes it read the keyboard as usual).

If it reaches 20, first, "COUNT" is reset to zero (lines 650-660), ready for the next go. Then it tests a variable which I have called "CURSFLAG". This contains either 0 or 1.

If "CURSFLAG" contains zero, the character "under the cursor" is reversed, by adding 128 to it (lines 740-810).

If "CURSFLAG" containes one, the character is put back to normal by subtracting 128 (lines 860-920). (I hope that you are aware, that you can do this with all screen codes, simply by adding or subtracting 128 to it...)

This is all there is to our cursor routine, except that every time "CURSFLAG" is zero, we load it with one and every time it is one, we clear or reset it. Don't think me too pedantic mentionig this little matter, because if you overlook it I can assure you the computer won't! And this will result in the cursor being off most of the time, which means you won't have a cursor!

Turning the Cursor Off

As I've said already, lines 310-390 turn our cursor off, by changing the vector at $0314 back to normal.

I mention this specifically, because if you use your own interrupt routine you should always turn it off, when you don't need it any more!

The first reason for this is that your interrupt routine might slow other operations down, such as loading or saving to disk or tape, especially if your interrupt routine is longer than the one in ROM.

Secondly, it is easy to forget that your routine will indeed be executed every 60th of a second! Therefore, some of the variables which you use in the interrupt routine might be used by the operating system or by the program you are running in the meantime.

For example, if you use my "Speedy Assembler" routine (notice the subtle plug!), you should always turn off any interrupt routines you are experimenting with, before reassembling them. And above all, take care to reset all vectors as they were before. "Speedy Assembler", like many other programs of this kind, changes some of the vectors for its own purposes. If you want to be safe, exit from the assembler, run your program and then re-enter "Speedy Assembler" by typing "SYS 22623".

Introducing a Textfile

Having created our very own cursor (and I hope you will feel free to experiment with different versions) we now want to expand our typewriter routine in order to see our cursor working in all its aspects.

Figure 1
SEI=SEt Interrupt flag
CLI= CLear Interrupt flag
PHA=PusH contents of the Accumulator
PHP=PusH contents of the Processor status register
PLA=PuLl contents of the Accumulator
PLP=PuLl contents of the Processor status register

The main program in Listing 1 is similar to my last one, apart from the fact that I've added quite a few facilities to it, which makes our program more like a wordprocessor.

First of all, I have introduced a textfile which is useful for saving the text we have written and also sending it

to the printer later on. A textfile is an area in memory (in my case starting from 10000 but you can change this to any location which suits you) which stores the printable characters we have typed. In lines 140-170, "TEXTFILE" is initiated, and in line 780-790 the ASCII-character which results from the keypress is put into "TEXTFILE".

The accepted way to store characters with wordprocessors is in ASCII and not in the Commodore screen codes. Printers, including the Commodore printers, know nothing about screen codes, and later on you might even want to send a textfile down the line to another computer. ASCII is the standard and Commodore screen codes aren't!

Having introduced a textfile we have of course to take other routines into acount! In other words, we are now dealing with two "current positions": one on the screen and one in the textfile! Both have to be updated in concord.

CRSR Left and Right

Since we have now got a cursor, we naturally need to move it! To this purpose I have built a cursor left and right faciity into the program. And here I have been more clever than usual! Instead of writing two separate routines I have built both facilities neatly into the existing routines.

The idea is simple, if you move the cursor to the right, it is the same as if you enter letters – only without the letters, if you get my drift...

On the other hand, if you move the cursor to the left, it is like deleting characters – only without actually deleting anything.

Therefore, cursor right fits neatly into the normal writing routine, while cursor left goes into the deletion routine.

With the cursor routine, the only important thing is, that I don't want the cursor right ASCII-character, which is 29, to be printed on the screen, because this would give me "]", as it happens. So whenever CRSR right is pressed, the program jumps straight to line (980) where the print position (both on screen and in the textfile) is updated.

For cursor left I had to do some modifications to the deletion routine:

First of all, in lines 1340-1390 I used the X-register instead of the accumulator to test for the beginning of the screeen. This is because I do not want to corrupt the contents of the accumulator, which at this point contains the result of the last keypress.

Then I save the contents in the accumulator by pushing it onto the machine stack (line 1430). (More about this in a minute!). This allows me to decrement the print position one to the left, as usual. It suits me that it recovers the character to the right too, because in this way I get rid of the cursor!

Afterwards I pull the contents of the accumulator from the machine stack (line 1760) and give it another test. If it contains 20, then it is the deletion routine, if it contains 157, then it is cursor left, which means that no further action needs to be taken. It jumps straight to the exit in line 1890.

Pushing and Pulling

In the first article of this series I briefly mentioned the existence of the so-called machine stack.

The trouble with the machine stack is that, like so many others in computing, it is thought of as mysterious, and difficult. In reality it is nothing more than another area in the computer-RAM (starting at $0100 or decimal 256 – the next page after zero-page) which is used for storing data.

These data-bytes are simply piled on top of the other. This has the effect that the machine stack grows to the roof. (Where else should it grow, if you pile things on it?). With heaps like this it would of course, not be a very good idea to retrieve items by pulling them from the bottom or the middle. If you do this with a pile of books, you might easily have a nasty accident. Nothing like this happens with the machine stack, but the data-byte you pull is meaningless to the computer.

So, you "push" things onto the top of the stack and you "pull" them back from the top again. The secret of the whole thing lies in the sequence in which you do all your pushing and pulling:

If you push A, B, and then C, and you want then to start pulling things again, the first thing you get is C, B, and finally A. The whole secret of using the machine stack lies in pulling first what you pushed last, and pulling last what you pushed first.

The 6510 actually has a special register – the "stack pointer", which you can program and therefore change the top of the stack, as it is perceived by the computer. But this is something for connoisseurs and kamikaze pilots. You also always have to bear in mind the machine stack, and whether its proper functioning is vital to the proper functioning of the computer as a whole!

Because every time the 6510 jumps to a subroutine it pushes the return address onto the stack. If, at the end of that subroutine, it can't retrieve the proper address back from the stack, it is well and truly lumbered!

So, if you push something onto the stack, always be sure to pull it before you leave the subroutine you are in!

The advantage of using the stack to store things, is that it is convenient and cheap in memory. "PHA" and "PLA" together use only two bytes, and that's half the length you need if you store in a zero-page variable. The disadvantage arises if you are not quite certain whether you will have pulled before you exit.

For example, at the beginning of our deletion routine I could have pushed unwittingly the contents of the accumulator onto the stack before I tested the screen position in lines 1340-1390. But this would result in the stack getting out of order every time the user presses the deletion key at the beginning of the screen. Because it would then jump straight to the exit in line 1890 and this would mean that there would be no equivalent pull from the stack! This would have created the type of classic machine code bug that usually takes days to find!

Unlike other microprocessors, the 6510 allows you to push only two registers onto the stack: the accumulator and the flagregister. "PHA" stands for "PusH the Accumulaotr onto the stack", while "PLA" stands for "PuLl the Accumulator from the stack". To push and pull the flag register use "PHP" and "PLP" respectively.

And Finally

Everthing else in Listing 1 is very much the same as it was last time. I would like to give a special mention to lines 430 and 1980 which turn our cursor on and off and thus activate and de-activate our interrupt routine in listing 2.

I'll leave you with a little something to try for yourself. What about adding a CRSR up and down routine to our program? Here comes the only hint I am willing to give you – you have to add 40 to the screen (and textfile) position for CRSR down and subtract 40 for CRSR up. YC

See listings on page 77.

80 Character Print Out

Improve the printing powers of your C64 to produce 80 characters per line with this handy program.

By Jens Meyer

This program enables the Commodore 64 to print 80 characters per line instead of the usual 40. It does this by using the graphics screen, and not the text screen. All inputs are diverted to the graphics screen, where the letters are printed to half their normal width. Despite the fact that they are much thinner than normal letters, they are still clear and can be read easily.

The program is written entirely in machine code, but can be loaded normally and started using "RUN".

After loading you will be asked if you want the Eprom version – type 'N' for no and 'Y' for yes. If you select yes, a new version of the program starting at $2000 will be saved to disk, enabling the user to program an Eprom with it later on, if you have the necessary equipment. The Eprom has some advantages to the normal version. It is much more compatible with other programs, as it is "Hidden Away" under the ROM and not stored in the Basic memory.

However, most users will select "NO". This will start the program immediately and means that you can simply save it to disk or tape with no need to program an Eprom, as this version creates the 80 column display.

The Eprom option merely exists for a very small minority of people.

When the program is started, the following restrictions and changes occur:

- As the program uses the Hi-Red mode, only one colour can be used at any one time.
- The screen memory map is twice as big as usual because there are twice as many characters, and goes from $CFCF.
- It is possible to mix upper and lower case letters and graphics because the graphics mode is being used, and letters which are already on the screen will not be changed, even if, for example (SHIFT)+(COMMODORE) are pressed. The new character set is created by using bits 0,2,4 and 6 of the letters of the old character set.

Also, there is a routine in the memory which scrolls up everything on the graphics screen by 8 pixels (one line) to imitate the scrolling upwards in the text mode.

The characters are stored in both the screen memory map and the graphics bit map.

The following table shows the use of the memory by 'ROM 80':

$C400-$C7FF		NEW CHARACTER SET
$C800-$CFCF		SCREEN MEMORY MAP
$CFD0-$CFFB		ROUTINE FOR SCROLLING GRAPHICS
$CFFF		PRESENT FORE - AND BACK-GROUND COLOUR
$DC00-$DFE7	($5C00-$5FE7 IN RAM VERSION)	COLOUR
$E000-$FF3F	($6000-$7F3F IN RAM VERSION)	GRAPHICS BIT MAP

But enough of all the technical details. If you want your Commodore 64 to have an 80 column display, just use 'ROM 80'. YC

See listings on page 77.

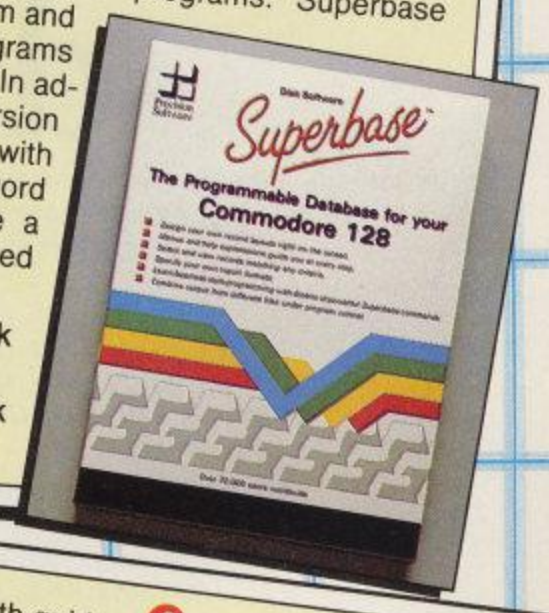
The most powerful productivity software ever developed for your computer

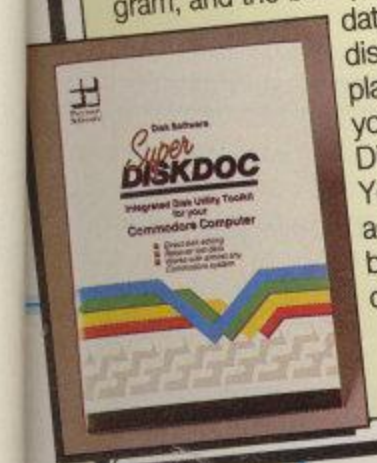
SuperScript gives you everything you need for professional word processing in one easy to use package. Its menu command structure puts you immediately at ease, with no complicated commands to memorise, yet SuperScript combines business-style editing, spell checking, calculator, row and column arithmetic and full mail merge facilities. The phrase glossary feature enables you to store whole passages of text, or command sequences and recall them with a simple key.

Commodore 64 disk **£24.95**
Commodore 128 disk **£29.95**

Superbase is the most powerful database system ever developed for 8 bit computers. Why? Because not only can you access its commands from menus but you can string them together with BASIC commands to form your own complete programs. Superbase can import data from and export to other programs via sequential files. In addition the C-128 version will load together with the SuperScript word processor to create a completely integrated office system.

Commodore 64 disk
£24.95
Commodore 128 disk
£29.95



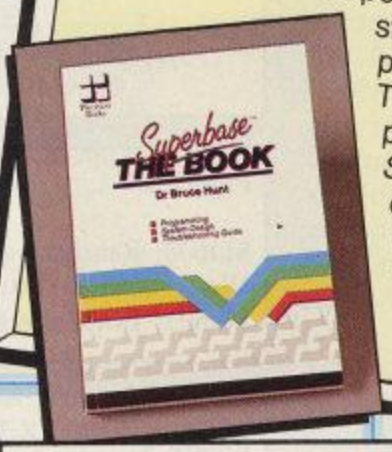


SuperDiskdoc is the ultimate Commodore disk utility program, and the best protection there is for your valuable data. Zoom in on the bytes on your disk, interpret them in hex, ascii or plain English, make any changes you want, then replace them. Superdiskdoc brings you extra security. You know that in the event of an accident to your data you have the best tool available to repair the damage.

Commodore disk **£9.95**

The in-depth guide to using the Superbase system, from first steps through to advanced programming techniques. The wealth of hints, tips and practical examples makes *Superbase*: The Book required reading for anyone working or contemplating working with Superbase.

194 pages **£11.95**



ORDER FORM

Mail to: Precision Software Limited,
6 Park Terrace, Worcester Park, Surrey KT4 7JZ

Please send me:

_____

_____

Free Post and Packaging within the UK.

☐ Cheque enclosed ☐ Visa ☐ Access / Mastercard

Credit Card Number ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Expiry Date _____ Signature _____

Name _____

Address _____

_____ Post Code _____

14 Day Money Back Guarantee – Return your package unopened and we will refund your purchase price.

YC 3

Precision Software

Precision Software Ltd. 6 Park Terrace,
Worcester Park, Surrey KT4 7JZ
Telex: 8955021 Precis G Fax: 01-330 2089

Phone for our catalogue: 01-330 7166

Controlling the 80 column video display

If you own a C128 and you're eager to know more about the capabilities and limitations of VDC, then read on.

By Leigh Brown

It is useful to have a rudimentary knowledge of Machine Code as some of the operations that the 8563 can perform are not possible in BASIC. Also, it is important to remember that a monitor is needed for 80 columns and some people may not be able to afford the expensive Commodore monitor. I would advise those people to use a standard monochrome monitor.

The VDC has been designed to cater for most of the programmers' needs. For example, it has its own cursor and its own 16K bytes of RAM. However, it has a few drawbacks, but you should get used to these after using the VDC for a while. The first of these is the addressing of the VDC. All of the 37 registers are accessed via two locations in the Input/Output area of the computer. These locations are $D600 and $D601 and act as a simple Input/Output port. For example, to store 15 in register 11 you store 11 in location $D600 and then store 15 at $D601. And to read from register 11 you store 11 in location $D600 and then read the value from $D601.

Figure 1

7	6	5	4	3	2	1	0
ALT	RVS	UND	FLA	RED	GRE	BLU	INT

Figure 2

$D600: Read: --- --- <<6 bits register select>>
Write:s Write: status Lpen Vblank --- --- --- --- ---
$D601: Both: <<8 bits for reading and writing data>>

Figure 3

Reading to and writing from registers: Using these routines, X is the register and Accumulator holds data.

```
.write      STX $D600      /Write register
.test1      BIT $D600      /is VDC busy?     ROM COPY
            BPL test1      /yes, then wait   AT $CDCC
            STA $D601
            RTS
.read       STX $D600      /Write register
.test 2     BIT $D600      /is VDC busy?     ROM COPY
            BPL test2      /yes, then wait   AT $CDDA
            LDA $D601
```

Location $D600 also has some other uses when read. Bit 7 returns the status of the VDC, in other words whether it is busy or not, as some operations take some time. Bit 6 is used for the light pen, which doesn't concern us. Bit 5 is the vertical flyback bit, so you can synchronize events to the monitor or alter the screen without flickering occuring.

The 16K RAM of VDC

As mentioned before the VDC 'owns' its very own RAM, but it can only be indirectly accessed via the registers. This means you can redefine the character set which is held in the VDC RAM, or store directly to screen. However, this cannot be done in BASIC, so we must resort to machine code. The registers we need are 18, 19, 30, and 31. They must be written to in this order:

Store the high byte of the address in register 18.
Store the low byte of the address in register 19.
Store the byte to poked at address in register 31.
Store the number of characters in register 30.

However, the VDC stores the number of characters plus one. So in register 30 we have to store the number of characters minus one. Also, you may have noticed that you can't print one character. Oh well you can, all you need to do is *not* write the number of characters to register 30. The whole process is carried out with bit seven of register 24 cleared.

You can also copy RAM from place to place, using the same method but thankfully it works properly! The number of characters to be copied corresponds to the word count register (31). The method is basically the same as storing characters but you must set the copy bit in bit 7, register 24. The start address to be copied is stored in registers 18 and 19, and the destination address is stored in registers 32 and 33. The copying process begins when the word count register is written to.

The VDC Screen

The screen is extremely versatile – you can change the physical size of the

Figure 4

Reading and writing RAM. Writing one character:

```
.write1     PHA          /tempory store
            TXA          /store
            LDX  #19     /low
            JSR write    /byte.
            DEX          /store
            TYA          /high
            JSR write    /byte
            LDX  #31     /recall
            PLA          /and store
            JSR write    /data
            LDA  #18     /store dummy
            JMP write    /and leave (if stand alone
.write      STX $D600    /omit 'JMP write')
.test1      BIT $D600
            BPL test1
            STA $D601
            RTS
```

Writing more than one character: Accumulator holds the character to be stored, location 250 holds number of characters minus 1, X and Y hold the low and high address of the location in VDC memory.

```
.writem     PHA
            TXA
            LDX  #19     /write low byte.
            JSR write
            DEX
            TYA          /write high byte.
            JSR write
            LDX  #31     /write character
            PLA          /to be stored.
            JSR write
            LDA 250      /write number of
            DEX          /characters-1.
.write      STX $D600
.test1      BIT $D600
            BPL test1
            STA $D601
            RTS
```

Reading a byte from RAM.

```
.read1      TXA          /store
            LDX  #19     /low
            JSR write    /byte
            DEX          /store
            TYA          /high
            JSR write    /byte
            LDX  #31     /recall
            JSR read     /and store
            RTS          /return, Acc. = value
.write      STX $D600
.test1      BIT $D600
            BPL test1
            STA $D601
            RTS
.read       STX $D600
.test2      BIT $D600
            BPL test2
            LDA $D601
            RTS
```

Continued on page 57

COMMODORE PLUS-4/C16 NEW!-BANGS AND CRASHES!! RHYTHM BOX

This Rythm/Drum box will set your feet tapping! At a very modest cost you can sequence a wide variety of digitally recorded percusion sounds. Very easy to use. No knowledge of music is required. In seconds you can set up pulsating rythms to accompany your music. A variety of drums, tom toms, cymbals and a bass guitar combine to produce sounds you never thought possible on the C16/Plus 4. Easy entry of rhythms and a powerful pattern editor. An excellent package — good value at **£7.95** cassette **£9.95** disc.

NEW!-WISP Amazing new product!

WISP offers you a refreshing new way to operate your PLUS 4. WISP stands for Windows Icons Silicon-disc Package. It is packed with many powerful features. Everything in your new operating enviroment is run through windows — just like on very expensive computers. Built in window facilities include a) calculator b) silicon disc c) note pad d) directories e) fast load and save f) error trapping g) programming windows.
Windows may be closed and neatly stored as icons. A smooth sprite is used to select the windows you wish to use from the pull down menus.
With the silicon disc you can instantly save, load and directory — all in under half a second (much faster than even a disc drive!).
The fast load and save to cassette is about ten times normal speed! We have never before sold such a feature packed program to give you power to control your computer to its limits. The ulitmate programming environment. Incredible value. Plus 4 only. Cassette — **£9.95** Disc **£14.95**.

NEW!-BLACK CAT 2

We have black cat 2 in stock and waiting to be despatched to you! Have you ever wanted to use your PLUS-4 Wordprocessor, Spreadsheet, Business graphics etc. with a cassette unit? This program allows you to save your files to cassette rather than disc (as forced to by Commodore).
Version 2 incorporates a FAST load and save system so you can save your files to cassette at disc speed! Quick, convenient, easy to use. Only **£5.95**

THE MIRROR-TAPE BACK UP

Super tape to tape back up copier catering for many PLUS-4/C16 games. Backs up both standard and FAST loading software. Very popular utility — Excellent Value — **£7.95**

THE WAND-TAPE TO DISC

Make full use of your disc drive by effortlessly converting many of your games/software to disc. We have had many letters telling us how much people appreciate this utility. Excellent value — supplied on disc — **£12.95**

PHOTON LOAD- FAST LOAD AND SAVE

Have you ever wasted time waiting for your programs to load or save? PHOTON LOAD, the new cassette operating system loads in seconds and allows you to load and save your programs at about TEN times the speed of a normal load or save. Why spend money on a disc drive when you can load and save this fast. Great value **£7.95**

SUPER SPRITE

This extremely clever utility allows you to use 8 sprites simultaneously over a low-resolution screen. With this program you can now imitate the sprites found on the Commodore 64! A complete package with FREE demo programs and a FREE sprite designer. What more do you need to bring real power to your games on your C16/PLUS 4. A must for games programmers. Excellent value — Cassette **£7.95** Disc **£9.95**

ELECTRIK PENCIL!!!

A truely excellent high resolution art program. Magnificant masterpieces can be quickly drawn using the powerful facilities provided by this package. Impressive results in no time at all. Cassette only **£7.95** Disc only **£9.95**

CASSETTE INTERFACES

If you have a Commodore 64 cassette unit which you would like to use with your C16/PLUS 4 then you need one of these. Just plug in and go! — Only **£5.95**

MERLIN ASSEMBLER

100 o/o machine code assembler for the Plus-4/C16. Very fast assembly of source code. Easy entry/editing of code via the full screen editor. Full load/save and printer facilities. Variable names, labels, hex/decimal, text and data statements, remarks, post indexing of variables etc. Many other facilities too numerous to mention. Highly recommended — A truely superb assembler. Comes with instruction booklet and working examples of machine code routines. READ THE EXCELLENT REVIEW IN YOUR COMMODORE - MARCH 1987. Cassette **£8.95** Disc **£13.95**

JOYSTICK ADAPTORS

Converts any joystick to Plus 4/C16 format. Simply plug in and go! Only **£3.50**

Tape Head Alignment C16/+4

The perfect cure for the majority of loading programs. Specification as for the Commodore 64 (see below). Only **£6.95**

COMMODORE 64 EVER HAD A LOADING PROBLEM?

Then send off for WIZARD'S "TAPE HEAD ALIGNMENT KIT 64" — The most common cause of loading failure is bad alignment of your tape heads. This kit allows you to set up the tape heads of your cassette unit for the BEST possible loading conditions. In many cases this will make a remarkable difference in loading reliability. The complete feature packed kit — **£6.95!!!**

RAPID despatch of orders.

Send an S.A.E. for our current catalogue with full descriptions. U.K. P&P FREE and by FIRST CLASS post. Europeans please ADD 50p. Outside Europe ADD £1.50 for AIR MAIL. Overseas orders welcome. All payments must be made in pounds sterling. Cheques/POs to:

WIZARD SOFTWARE (Dept. Y101), 20 Hadrian Drive, Redhills, Exeter, Devon EX4 1SR.

WIZARD SOFTWARE *(Dept. Y101) 20 Hadrian Drive, Redhills, Exeter, Devon EX4 1SR.*

POOLSWINNER II

THE ULTIMATE POOLS PREDICTION PROGRAM

Boxed, with detailed instruction booklet

- **MASSIVE DATABASE** Poolswinner is a sophisticated Pools prediction aid. It comes complete with the largest database available – 22000 matches over 10 years.
- **PREDICTS** Not just SCOREDRAWS, but AWAYS, HOMES and NO SCORES.
- **SUCCESSFUL** SELEC guarantee that Poolswinner performs significantly better than chance.
- **ADAPTABLE** Probabilities are given on every fixture – choose as many selections as you need for your bet. The precise prediction formula can be set by the user – you can develop and test your own unique method.
- **SIMPLE DATA ENTRY** All team names are in the program. Simply type in the reference numbers from the screen. Or use FIXGEN to produce fixture list automatically (see below).
- **LEAGUE AND NON-LEAGUE** All English and Scottish League teams are supported, and also the non-league sides often used on pools coupons.
- **PRINTER SUPPORT** Full hard copy printout of data if you have a printer.

PRICE £15.00 (all inclusive)

NOW AVAILABLE

FIXGEN 87/8

AT LAST: No more struggling for hours to get the fixture list into the computer. FIXGEN has been programmed with all English and Scottish League fixtures for 1987/8. Simply type in the date, and the full fixture list is generated in seconds. Fully compatible with Poolswinner. Yearly updates available.

POOLSWINNER with FIXGEN £16.50 (for both)

COURSEWINNER V3

THE PUNTERS COMPUTER PROGRAM

NOT JUST A TIPSTER PROGRAM, Coursewinner V3 can be used by experts and occasional punters alike. You can develop and test your own unique winning system by adjusting the analysis formula, or use the program in simple mode. Coursewinner V3 uses statistical analysis of major factors including past form, speed ratings, course statistics, prize money, weight, going, trainer and jockey form etc, etc. It outputs most likely winners, good long odds bets, forecasts, tricasts etc. The database includes vital course statistics for all British courses. You can update the database – never goes out of date. *FULL PRINTER SUPPORT.*

PRICE £15.00 (all inclusive) includes Flat AND National Hunt versions.

ALL PROGRAMS AVAILABLE FOR: AMSTRAD CPCs, AMSTRAD PCWs, PC1512, All BBCs, All SPECTRUMS, COMMODORE 64/128.
Supplied on tape (automatic conversion to disc) – except PCW and PC1512 (on disc – add £3.00).

order with VISA phone 24 hrs

Send Cheques/POs for return of post service to . . .

selec SOFTWARE

order with Access phone 24 hrs

37 COUNCILLOR LANE, CHEADLE, CHESHIRE SK8 2HX. ☎ 061-428 7425

(Send for full list of our software)

WORLDWIDE SOFTWARE

C64/128	cass	disk
Street Baseball	7.25	9.00
Street Basketball	7.25	9.00
Subbattle Simulator	7.25	11.20
Super Hang On	7.25	11.20
SuperSprint	7.25	11.20
Through the Trap Door	6.55	11.20
Thundercats	7.25	11.20
Victory Road	6.55	9.75
Wizard Wars	7.25	9.00
Wizzball	6.55	9.75
World Class Leaderboard	7.25	11.20
720 degrees	7.25	9.00
C64/128 Disk only		
Alternative Reality Dungeon		14.95
Autoduel		14.95
Battlecruiser		19.95
Battles in Normandy		18.95
Broadsides		19.95
Carriers at War		24.95
Colonial Conquest		19.95
Defender of the Crown		11.20
Destroyer		11.20
Europe Ablaze		23.95
Guild of Theives		14.95
Hitchikers Guide to Galaxy		19.95
Hollywood Hi Jinx		19.95
Leather Goddess (Adults only)		19.95
Lurking Horror		19.95
Moebius		14.95
Ogre		14.95
Panzer Grenadier		19.95
Plundered Heart		11.20
Shylo		19.95
Silent Service		11.20
Stationfall		19.95
The Pawn		14.95
Ultima I/II/IV/V		14.95
Up Periscope		28.95
USAAF		23.95
Wargame Construction Set		14.95
Witness		19.95
Lockable 100 disk storage box		9.95
or storage box + 10 Blank disk		16.95
AMIGA		
King of Chicago		22.95
Roadwar Europa		18.95
SDI		22.95
Silent Service		18.95
Sinbad		22.95
Starglider		18.95
Terrapods		18.95

C64/128	cass	disk
Airborne Ranger	11.20	14.95
Alternate World Games	7.25	11.20
Bankok Knights	7.25	11.20
Blood Valley	7.25	11.20
Buggy Boy	7.25	11.20
B24	11.20	14.95
California Games	7.25	11.20
Capt. America	7.25	9.00
Compendium	7.25	11.20
Driller	11.20	14.95
Elightenment Druid II	6.55	9.75
Elite 6 Pack Vol 2	7.25	11.20
Eye	7.25	11.20
Firetrap	7.25	11.20
Flight Sim II	29.95	37.95
Flying Shark	6.55	9.75
Football Director 6.55		
G Linekers Super Soccer	7.25	11.20
Galactic Games	7.25	11.20
Game Set & Match	9.75	13.50
Gauntlet II	7.25	9.00
Gryzor	6.55	9.75
Gunboat	6.55	10.95
Gunship	11.20	14.95
International Karate +	7.25	11.20
Knight Orr	11.20	11.20
Last Ninja	7.25	11.20
Live Ammo	7.25	11.20
Magnetron	6.55	9.75
Mean Streak	7.25	9.75
Mini Office II	12.75	14.95
Morpheus	6.55	9.75
Outrun	7.25	9.00
Pirates	11.20	14.95
Psycho Soldier	6.55	9.75
Ramparts	7.25	9.00
Red October	11.20	14.95
Roy of the Rovers	7.25	11.20
Rygar	7.25	11.20
Shoot em Up Const. Set	11.20	14.95
Slaine	7.25	9.75
Stealth Fighter	11.20	14.95
10 5¼" Blank Disk		7.99
AMIGA		
California Games		18.95
Defender of the Crown		22.95
Flight Simulator II		37.95
Goldrunner		18.95
Guild of Theives		18.95
Insanity Fight		18.95
Karate Kid II		18.95

PLEASE PHONE FOR DISCOUNT PRICES OF ITEMS NOT LISTED

All prices include post & packing in U.K. Overseas orders please add £1.00 per cass/disk for AIR MAIL delivery.
Cheques or postal orders payable to:

WORLDWIDE SOFTWARE
1 Bridge Street, Galashiels TD1 1SW Tel: 0896 57004
all items subject to availability E & OE

Questionnaire 1

Whether you wish to test your neighbours IQ or find out how clever friends at your computer club are, this program will help you.

By David Warner

Questionnaire I enables you to compile your own multiple-choice quizzes and save them out to disk for use at a later date. You can use the program just for fun or even use it for educational purposes.

The program is presented here as two Basic programs. Type them both in separately and save them out to disk. When you want to use the program simply LOAD and RUN the program "Q-BOOT". The second part of the program will then load and execute automatically.

What's the question?

Obviously before you use the program for the first time you will need to set up some questions.

When you select the 'create questions' options from the main menu you will be asked for the number of questions that you want to set. You will then be asked for each question in turn together with a number of possible answers. Once all of the information for each question is answered, you will be asked to indicate which is the correct answer.

If you find that your question is over one line in length, you must start the next line *three* spaces from the start of the second line. This is to ensure that the text will be correctly formatted when displayed on the screen.

See listings on page 77.

Save your work

When saving your questions out to disk, you may find it useful to include the number of questions within the filename. The reason for this is that you will need to tell the computer how many questions are to be loaded when you want to reuse any quizzes that you have set. As an example "HISTORY 20" would be a set of 20 history questions.

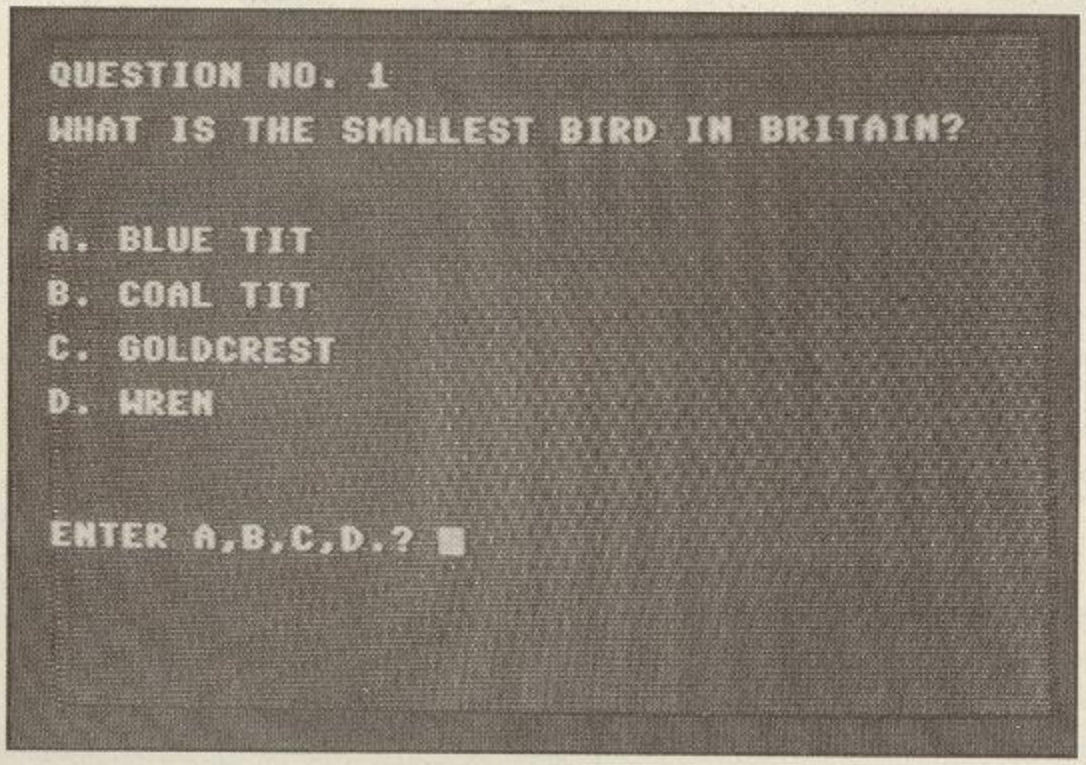
Time out

Provision is made within the program to display a clock on the screen. To use this feature you should enter the time in the format P.12.05.00 the P being PM (A for AM) and the following numbers being the hours, minutes and seconds respectively.

Software for Sale

Should you purchase this month's software for sale disk you will find that there are three sets of example questions for this program on it.

YC



MICRO MEDIA
Computer Supplies Ltd.

Freepost,
Dept. PCW, Rydal Mount, Baker Street,
Potters Bar, Herts EN6 3BR (NO STAMP REQUIRED)

0707 52698 (5 lines)

Head Cleaners

	1	2+	6+
5¼"	3.95	3.50	3.15
3½"	5.00	4.55	4.10

5¼ MICRO MEDIA Brand Discs
includes Plastic Library Case

	10	30	50	100	250
SS/DD	6.55	18.55	29.05	53.10	118.00
DS/40T	7.90	22.30	34.90	64.60	144.50
DS/80T	9.40	26.50	40.20	75.15	165.90
DS/HD for PCAT	20.10	57.20	90.10	168.60	385.55

5¼ Reversible discs (Flippy's)
Have two write protect notches & index holes.
Suitable for 40 or 80 track drives.

10.55	30.00	47.40	88.10	204.55

3½ MICRO MEDIA Brand

SS/DD	17.55	50.45	80.25	147.70	347.80
DS/DD	18.75	53.90	85.95	159.20	376.55

All discs supplied are with labels, 5¼" write protects, envelopes & hub rings.

Discs purchased direct from one major manufacturer. 100% certified error free – lifetime guarantee.

PRICES INCLUDE V.A.T.

5¼ Rainbow Discs come in five colours

	25	50	100	250	500
SS/DD	16.50	30.75	57.10	134.50	252.45
DS/40T	17.95	33.10	60.70	141.45	262.20
DS/80T	19.00	35.20	64.85	148.75	276.00

5¼ Unbranded Discs

SS/DD	9.80	19.35	36.40	86.55	163.85
DS/40T	10.95	20.65	38.20	89.70	172.50
DS/80T	11.80	22.30	41.60	95.75	179.50

3½ Unbranded Discs

	10	30	50	100	250
SS/DD	15.10	42.60	65.95	117.70	264.75
DS/DD	16.20	45.70	72.95	128.50	290.00

AUTUMN CATALOGUE OUT NOW – CALL OR WRITE FOR YOUR COPY

Monitor Swivel Bases

Pan tilt revolves around 360 degrees
12.5 degrees tiltable up and down
Adjustable by front mechanism.

55 x 280 x 260mm for 12" Monitors		55 x 355 x 320mm for 14" Monitors	
1	12.10	1	16.70
3+	10.99ea	3+	15.15ea
6+	10.35ea	6+	14.30ea

Adjustable Copy Holder

A4 adjustable desk clamping.
Magnifying cursor line.
Paper thickness adjustment.
Paper height adjustable clip.

A4 Version 25.35
Holds up to 300g

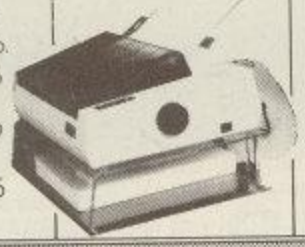
Desk Top Version 13.69
Holds up to 1000g

A3 Version 40.65
Holds up to 1400g

Printer Stand
5mm perspex

80 Column Version
400 x 310 x 100mm **21.65**

132 Column Version
600 x 310 x 100mm **29.30**



Mobile Printer Stand

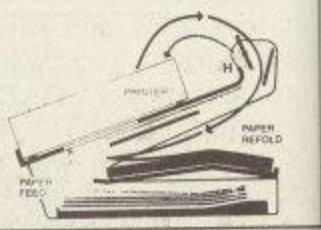
Rugged steel frame. Height adjustable basket for output paper & base shelf for input paper. Self assembly – includes castors.

80 column	£52.90
132 column	£65.40

The Space Saver

Paper feed and refold positioned one above the other. Dial controlled paper feed with adjustable deflectors ensures smooth flow and automatic refolding.

80 column 414x380x460mm		132 column 530x380x460mm	
1	34.85	1	42.50
3+	32.75	3+	40.00
6+	31.05	6+	38.30



Printer Ribbons

Prices (£) per each ribbon

	3	6	12
Amstrad 8512/8256	5.65	5.35	4.90
R, G, BR, BL, Y	7.50	7.10	6.55
DMP 2000/3000	2.80	2.60	2.35
Brother HR15 MS	3.30	3.10	2.80
R, BR, BL	4.35	4.10	3.75
Centronics GLP	3.65	3.45	3.15
R, G, BR, BL, Y	4.65	4.40	4.00
Canon 1080/1156	3.30	3.10	2.80
R, G, BR, BL, Y	4.95	4.65	4.25
Citizen 120 D	4.70	4.35	4.15
Diablo Hytype II MS	2.80	2.65	2.40
R, BR, BL	3.80	3.55	3.25
Epson			
FX/MX/RX 80 FX 800	3.55	3.35	3.10
R, BR, BL, G, Y	4.95	4.65	4.25
MX 100/FX 1000/FX 105	4.65	4.35	4.20
R, BR, BL	5.85	5.55	5.10
LX 80/86 GX 80	2.80	2.65	2.40
R, G, BR, BL, Y	4.70	4.45	4.05
Juki 6100 MS	3.30	3.10	2.80
6100 SS	2.05	1.90	1.75
R, BR, BL	2.75	2.60	2.35
Kaga KP810/910	3.30	3.10	2.80
R, G, BR, BL, Y	4.95	4.65	4.25
M/Tally MT80 MS	4.10	3.85	3.55
Panasonic KXP110	5.50	5.20	4.75
R, G, BR, BL, Y	7.20	6.80	6.25
Qume IV MS	3.30	3.10	2.80
Fabric	3.30	3.10	2.80
Star NL 10	5.50	5.20	4.75
Shinwa CP80 MS	4.10	3.85	3.55

One off if ordered with other product
Please mix colours and types for best prices
R = Red, BR = Brown, BL = Blue, G = Green, Y = Yellow

If the ribbon you require is not listed please let us quote

The above is a small selection of the 250 different ribbons we stock. We shall be pleased to find your ribbon, however old or obscure.

MD 120
5¼" x 120
1 12.55
3+ 11.90 each
6+ 11.35 each

MD 50
5¼" x 50
1 7.80
3+ 7.40 each
6+ 7.10 each

MD 100
5¼" x 100
1 10.80
3+ 10.30 each
6+ 9.80 each

Wire Printer Stand

stacks print-out in document tray automatically. Suitable for most standard printers. Made of safety coated steel wire.
For 80 column £14.50
For 132 column £16.50

MM 40
3½" x 40
1 8.30
3+ 7.90 each
6+ 7.50 each

MM 80
3½" x 80
1 10.95
3+ 10.40 each
6+ 9.90 each

Computer Labels
Continuous fanfold, sprocket fed

Price per	1,000	3,000
70 x 36	3.85	11.55
89 x 36	5.65	14.25
89 x 49	7.95	20.40
102 x 36	6.35	15.30

Please state no. of labels across the sheet (1, 2 or 3)

Computer paper
Plain fanfold, micro perf edges

Size	Weight gsm	1000s per box	1box	3bxs+
11x9½	60	2	16.90	43.80
	80	2	20.90	53.55
Exact A4				
11⅞x9¼	70	2	22.50	58.50
	90	1	16.90	45.15

ALL PRICES INCLUSIVE OF POSTAGE & PACKING AND V.A.T.

MICRO MEDIA
Computer Supplies
Freepost, Dept. PCW, Rydal Mount, Baker Street, Potters Bar, Herts. EN6 3BR

Access & Visa

Out of Office Hours (Answer machine)
0707 52698 (5 lines)
Orders despatched 24 hrs.
Please allow 5 days for delivery.
For next day delivery, please ring for details. Postage covers U.K. only.

A **Catalogue** is available with a more comprehensive range of products including – 3M & Verbatim discs – a wider choice of paper labels, ribbons and accessories.
Ring or write to obtain your copy now!

Educational and HMG orders accepted. For official orders/invoice/credit orders there is a minimum order value of £15.00 excluding V.A.T. Any order under £15.00 will be subject to £3.00 handling charge.

Personal callers welcome
Weekdays 8.30am - 5.30pm
Saturdays 9.30am - 1.00pm

-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-

May I Interrupt?

How to make your C64 reveal its split personality.

By Norman Doyle

Interrupts can make your computer do things that it was never designed to do. For example, it is impossible to have capital letters, Commodore graphics and lower case letters on the screen at the same time. The usual form is capitals and graphics with no lower case; or capitals, lower case and limited graphics.

To have everything on the screen at the same time, we have to change the screen style in mid-scan. This is known as a raster interrupt because it takes place during the time that the screen, or raster, is being scanned.

First of all, we have to tell the computer where we want the interrupt to occur on the screen. The scan time is divided into 256 parts but although a full scan takes 256 raster count units, the screen is only visible when the value lies between 51 and 251. By storing a value in $D012, you can cause an interrupt to occur at any moment during the scan period. If this occurs while the visible portion of the screen is being scanned, it is called a split-screen interrupt.

First of all, we have to set up the interrupt conditions. Listing 1 may seem familiar because it's based on the routine that I showed you last month. The new part of the initialise routine sets the raster interrupt.

The accumulator is loaded with the value which represents the point at which I want to interrupt the screen. It is stored in location SD012 – the raster compare byte. Next, the computer has to be told to expect a raster interrupt. This is done by setting the first bit in location SD01A.

You'll notice that there are two interrupt routines and that one modifies the interrupt vector (double byte $0314) to point to the other routine. So you establish two interrupt environments which are executed on alternate interrupt periods.

The basic routine causes the colours of the screen and border to change in mid-scan and the effect on the screen makes the top of the screen yellow and the bottom area black.

Apart from changing the interrupt vector, each routine has to reset the

Table 1

Command Type	Examples	No of cycles
Implied	CLC CLD CLI CLV DEX DEY INX INY NOP SEC SED SEI TAX TAY TSX TXA TXS TYA	2
	PHA PHP	3
	PLA PLP	4
	RTI RTS	6
Absolute	JSR	6
Relative	BCC BCS BEQ BMI BNE BPL BVC BVS	2*

**Add an extra clock cycle when the program takes the branch and add another if the branch then crosses a page boundary.*

value of the interrupt compare byte to that of the other interrupt value. Then the computer is told to execute the next screen interrupt by setting the lowest bit of location $D019.

In case you're wondering why two interrupt routines are necessary, consider what would happen with only one. When the first interrupt occurs the screen colour changes and will not automatically change back to the original colour. The net effect, therefore, would be to maintain yellow as the screen colour no matter what the run time program was trying to dictate. The second interrupt changes the colour so that the colour banding occurs.

The RASTER1 and RASTER2 values are arbitrary ones which I have selected for this demo. The first value must be less than 51 otherwise a black band would appear at the top of the screen – a good way to create a coloured band across the middle of the screen. RASTER2 determines where the colour change occurs, therefore any value between $43 and $FB could [illegible]

The second routine starts off with several NOP commands. Although these apparently do nothing, the effect is to delay the execution of the colour change so that it occurs at the end of a line. Without this delay, the interrupt would occur in the middle of the line causing glitches which may show up as flickering or create a 'step' on the smooth line of the screen split.

Such timing problems can be tackled in one of two ways. The NOP system lengthens the interrupt code and reduces the amount of time in which other things could be done. A better way of overcoming this problem is to place the colour change code further down the routine, after calculating the number of clock cycles which are needed for the delay. A list of these cycle times can be found in Table 1 and Table 2.

Table 2

	Accumulator	Immediate	Absolute	Absolute,X	Absolute,Y	Absolute Indirect	Zero Page	Zero Page,X	Zero Page,Y	(Indirect,X)	(Indirect),Y
ADC	.	2	4	4*	4*	.	3	4	.	6	5*
AND	.	2	4	4*	4*	.	3	4	.	6	5*
ASL	2	.	6	7	.	.	5	6	.	.	.
BIT	.	.	4	.	.	.	3	.	.	.	.
CMP	.	2	4	4*	4*	.	3	4	.	6	5*
CPX	.	2	4	.	.	.	3	.	.	.	.
CPY	.	2	4	.	.	.	3	.	.	.	.
DEC	.	.	6	7	.	.	5	6	.	.	.
EOR	.	2	4	4*	4*	.	3	4	.	6	5*
INC	.	.	6	7	.	.	5	6	.	.	.
JMP	.	.	3	.	.	5	.	.	.	.	.
LDA	.	2	4	4*	4*	.	3	4	.	6	5*
LDX	.	2	4	.	4*	.	3	.	4	.	.
LDY	.	2	4	4*	.	.	3	4	.	.	.
LSR	2	.	6	7	.	.	5	8	.	.	.
ORA	.	2	4	4*	4*	.	3	4	.	6	5*
ROL	2	.	6	7	.	.	5	6	.	.	.
ROR	2	.	6	7	.	.	5	6	.	.	.
SBC	.	2	4	4*	4*	.	3	4	.	6	5*
STA	.	.	4	5	5	.	3	4	.	6	6
STX	.	.	4	.	.	.	3	.	4	.	.
STY	.	.	4	.	.	.	3	4	.	.	.

**Add one clock cycle if indexing crosses a page boundary.*

The timing is not too crucial because setting up a new scan line takes approximately 28 cycles. From our example, we can calculate that nine NOP actions represent 18 cycles. This means we have to add between 18 and 46 cycles. If the following liners are moved to replace the NOPs, the program should run as if nothing has changed:

```
LDA # ROUTINE1&255 ... 2 cycles
STA LO.VECTOR ..... 4 cycles
LDA # ROUTINE1/256 ... 2 cycles
STA HI.VECTOR ..... 4 cycles
LDA # RASTER1 ..... 2 cycles
STA $D012 ..... 4 cycles
                Total=18 cycles
```

To get both sets of characters on the screen at the same time means indulging in a little emulation. This may seem like cheating but a little study of the ROM handling will reveal the reasons why the technical white lie is necessary.

The VIC chip can only access one 16K block of memory at a time. This not only applies to the screen but also to the character set. On power up the screen is situated at $0400 but the character ROM lies at $D000, well over 16K away. To allow the VIC to 'see' the ROM, the operating system places an 'image' of the ROM at $1000. This image is invisible to the user but essentially very real and necessary to the operating system of the computer.

All we do with the supplementary Listing 2 is to physically transfer the ROM characters to the lower section of memory where its image normally lies.

Having done this, the two routines have to be altered to switch between the 'capitals' characters and the lower case ones. This is done by altering location $D018 which acts as a character pointer. How this works does not concern us yet, it will be the subject of a later section of this series.

Next, enter Listing 3 and then run it. You will see two capitals blocks but press any key and the bottom set changes to lower cases. Now we have both character sets displayed at the same time.

Move the cursor to the bottom line of the screen and continue pressing down the cursor until the first line of the bottom block lies on the screen split. Now you can see that my 'arbitrary' split value was not so arbitrary after all!

What you should see is that the top half of the letters are in capitals while the bottom half remain in lower case.

That's as far as I am going during this session but next time I'll be concerning myself with smooth scrolling and the tricks that all this can open up to the programmer. YC

See listings on page 77.

H&P COMPUTERS UK

ARE YOU STILL PAYING HIGH PRICES FOR DISKS?

Are you still paying high prices for disks??

Look at our high quality, low cost disks!

10 5.25" DS/DD FLOPPY DISKS
ONLY **£6.00** incl

or

20 5.25" DS/DD FLOPPY DISKS
ONLY **£11.00** incl.

All disks include u.k. p&p, and are fully guaranteed

WE'VE SMASHED THE PRICES OF 3.5" DS/DD DISKS!!

You no longer need to pay high prices to get high quality disks!

10 3.5" DS/DD DISKS
ONLY **£15.00** incl

20 3.5" DS/DD DISKS
ONLY **£29.00** incl

SMART DISK BOXES AT EVEN SMARTER PRICES!!

3.5" Disk boxes, holds 80 disks -
ONLY **£12.50!**

5.25" Disk boxes, holds 50 disks -
ONLY **£9.50!**

5.25" Disk boxes, holds 100 disks -
ONLY **£11.50!**

SPECIAL OFFER!

£1.00 off any disk boxes when you buy 20 or more disks!

CONNECT IT TOGETHER WITH OUR QUALITY CABLES

CPC/1 C64/128 cebtronics printer cable	**£15.00** incl
CPC/2 2mtr. Serial Keyboard extension cable C64/128	**£7.00** incl
CPC/3 C128D Keyboard Extention cable	**£15.00** incl
CPC/4 Amiga 1000 Printer Cable	**£15.00** incl
CPC/5 Amiga 500/2000 Printer Cable	**£15.00** incl
S/PC/6 Amiga 1000 Serial Cable	**£25.00** incl
S/PC/7 Amiga 500/2000 Serial Cable	**£15.00** incl
ATC/1 Atari Printer Cable	**£15.00** incl
ATC/2 Atari Serial Cable	**£15.00** incl

C64/128 RS232 INTERFACE

The H&P Computers Commodore RS232 interface is a full industrial standard RS232 interface with all handshaking lines, that plugs into the user port. It will fit all modems and printers with a "25 way D connector
ONLY **£25.00** incl. And we give you an Xmodem comms program on disk - **FREE!!**

C64/VIC 20 COMPATIBLE POWER SUPPLY...

Fuse Protected & Fully Repairable with 12 Months Guarantee!!

ONLY **£19.00**

CUMANA CAX 354 AMIGA DISK DRIVE

Full 880K of formatted storage for either A500 owers or users of system 1 and 3 - A1000 series

NOW ONLY £125.00 incl!

ORDERS TO DEPT YC

H&P COMPUTERS UK

9, Hornbeam Walk, Witham, Essex, CM8 2SZ

24hour telephone answer machine service for Access orders on (0376) 511471

TOTAL BACKUP POWE
Now ACTION REPLA

NOW EVEN MORE POWERFUL, MORE FRIENDLY AND WI

ONLY £29·99 POST FREE

Action Replay works by taking a *'SNAPSHOT'* of the program in memory so it doesn't matter how the program was loaded – from tape or disk – at normal or turbo speed.

- **WARP 25. THE WORLD'S FASTEST SERIAL DISK TURBO – NOW EVEN FASTER! LOADS 200 BLOCKS IN 6 SECONDS! 240 BLOCKS IN 7 SECONDS!** – that's even faster than some parallel systems. Built in the cartridge – no extra hardware or software required. Includes supercast, warpsave, scratch, filecopy/convert. Integrated with normal disk turb for supercompatibility – auto detects warp or normal format so no special load commands are required. Turbo and Warp 25 speed are entirely independent of the cartridge with SUPERBOOT.
- **SIMPLE TO USE:** Just press the button and make a complete backup – tape to disk, tape to tape, disc to tape, disk to disk. THE PROCESS IS AUTOMATIC – JUST GIVE THE BACKUP A NAME.
- **TURBO RELOAD.** All backups will reload at turbo speed, COMPLETELY INDEPENDENTLY OF THE CARTRIDGE.
- **SPRITE KILLER.** Make yourself invincible. Disable sprite collisions – works with many programs.
- **PRINTER DUMP.** Freeze any game and print out the screen. Eg. loading picture, high score screen etc. Works with most printers. MPS 801, 803, Star, Epson etc. Double size, 16 shades, reverse print option. Very versatile – no user knowledge required.
- **PICTURE SAVE.** Save any Hires multicolour screen to disk at the push of a button. Compatible with Blazing Paddles, Koala, Artist 64, Image System etc.
- **SPRITE MONITOR.** Unique Sprite monitors allows you to freeze the action and view all the sprites, watch the sprite animation, save or delete any sprite. Load sprites from one game into another to make customised programs.
- **POKES/CHEAT MODE.** Press the button and enter those pokes for extra lives etc., then restart the program or make a backup. Ideal for custom games.
- **MULTISTAGE TRANSFER.** Even transfers multistage programs from tape to disk. The extra parts fast load – a unique feature. Enhancement disk available for non standard multi-loaders (see below).
- **SUPER COMPACTOR.** Ultra efficient program compaction techniques. Each program saved as a single file. 3 programs per disk side – 6 programs per disk, if you use both sides.
- **TEXT MODIFY.** Change title screens, high score screens etc. Put your own name into a game then restart it or make a backup to tape or disk. Very simple to use.
- **MONITOR.** Full feature 'Floating' type MACHINE CODE MONITOR. All standard features plus many more:- assemble, disassemble, hex dump, interpret, transfer, compare, fill, hunt, number conversion, bank switching, relocate, load/save etc. Uses no memory. Full printer support.
- **DISK MONITOR.** A special monitor for use on the RAM inside your disk drive. All the usual commands – a useful hacking tool.
- **WHOLE DISK COPY.** Copy a full unprotected disk in under two minutes with only one drive.
- **FAST FILE COPY.** Works with standard and Warp 25 files of up to 249 blocks. Converts formats to and from Warp 25.
- **FAST FORMAT.** Under 20 seconds.
- **TOOLKIT COMMANDS.** A whole range of useful new commands including: AUTO LINE NUMBERING, DELETE, MERGE, APPEND, OLD, LINESAVE, etc., PRINTERLISTER – list any program (including directory) directly from disk to printer or screen without corrupting memory.
- **REDEFINED FUNCTION KEYS.** Single stroke commands for operation of many common commands including: LOAD, SAVE, DIR. Load from directory – no need to type in filename.
- **TAPE TURBO.** Designed to make turbo load/save for your own programs. No screen blanking during loading.

REMEMBER all features are built in and available at the touch of a key. All features work with both **TAPE** and **DISK.** (Except multipart transfer & disk file utility).

ENHANCEMENT DISK

Contains routines for transferring many of the non-standard multi-load games from tape to disk. Over 40 titles. Latest additions are **LAST NINJA, ROAD RUNNER** (infinitive lives option), **BLOOD 'N' GUTS** (play any event), **DECEPTOR, LEADERBOARD EXEC** and **WORLD CLASS, KILLED UNTIL DEAD, MASK, INDIANA JONES, IMPLOSION, TAIPAN,** plus all the classics including **SUMMER GAMES, WORLD GAMES, DRAGONS LAIR** 1 and 2, **GAUNTLET, SUPERCYCLE** etc. Works in conjunction with **ACTION REPLAY.**

Disk includes **GRAPHIC SLIDESHOW** for displaying pictures saved with **ACTION REPLAY**. Plus Warp 25, Superboot – non Action Replay owners can speed up their 'expert' or 'freeze machine' programs to see what they have been missing.

TAKES A QUANTUM LEAP
MK IV HAS ARRIVED!

FOR CBM64/128

BACKUP MORE PROGRAMS THAN ANY RIVAL UTILITY.

BUT THATS NOT ALL ... NOW AVAILABLE FOR THE SERIOUS PROGRAM HACKER

ACTION REPLAY IV 'PROFESSIONAL'™

● All the features of the normal Action Replay IV but with an amazing on board LSI LOGIC PROCESSING CHIP. Plus 32K operating system ROM and 8K RAM CHIP. The first RAM/ROM based cartridge of its type!

ALL THE MK IV FEATURES PLUS ...

● **FULLY INTEGRATED OPERATION.** The MK IV 'Professional' has all the features of the MK IV plus an onboard custom LSI LOGIC PROCESSING CHIP that integrates the whole range of utilities and makes them available at the press of a button at any time.

● **EXTENDED MONITOR.** The 'Professional' has an extra powerful machine code monitor. Because it has both ROM and RAM at its disposal the Professional can freeze any program and then examine the WHOLE OF COMPUTER MEMORY in its frozen state including screen RAM, ZERO PAGE and STACK.

Full feature disassembly, compare, fill, transfer, hunt, relocate, jump etc. etc. In fact all the features of the best fully blown monitor available. Return to the frozen program at the press of a key at the point you left it! An absolute must for the program hacker – or even the programmer who needs to de-bug his program.

● **INTELLIGENT HARDWARE.** The Professional hardware is unmatched anywhere in the world today. The special logic processing chip can cope with protection methods as they appear by reacting to its environment.

MK IV PROFESSIONAL ONLY £34·99 POST FREE

WARP 25 Reloads an average BACK-UP in 6 Seconds!!

UPGRADE INFORMATION

MK III TO MK IV. Just send £9.99 and we will send you the new MK IV Chip to plug into your cartridge. Fitting is very easy.

MK III TO MK IV 'PROFESSIONAL'. Send your old cartridge plus £19.99 and we will send you a new Professional MK IV.

MK 3 Action Replay owners can get £10 as part exchange against either the MK IV or Professional. Send old cartridge plus balance.

PERFORMANCE PROMISE

Action Replay will backup any program that any other cartridge can backup – and more! It also has an unmatched range of onboard features. Before you buy check our competitors ads to see what they offer and see how many of the Action Replay MK IV features are either not there or have to be loaded from Supergate disks etc. When you buy Action Replay if you don't find our claims to be true then return it within 14 days for a full refund.

ALL ORDERS NORMALLY DESPATCHED WITHIN 48 HRS

HOW TO ORDER ...

BY PHONE	BY POST	EUROPEAN ORDERS
0782 273815 24 hr Credit Card Line	Send cheques/PO's made payable to 'Datel Electronics'	ADD £1.00 P+P OTHER COUNTRIES ADD £3.00 P+P Fax Orders 0782 264510

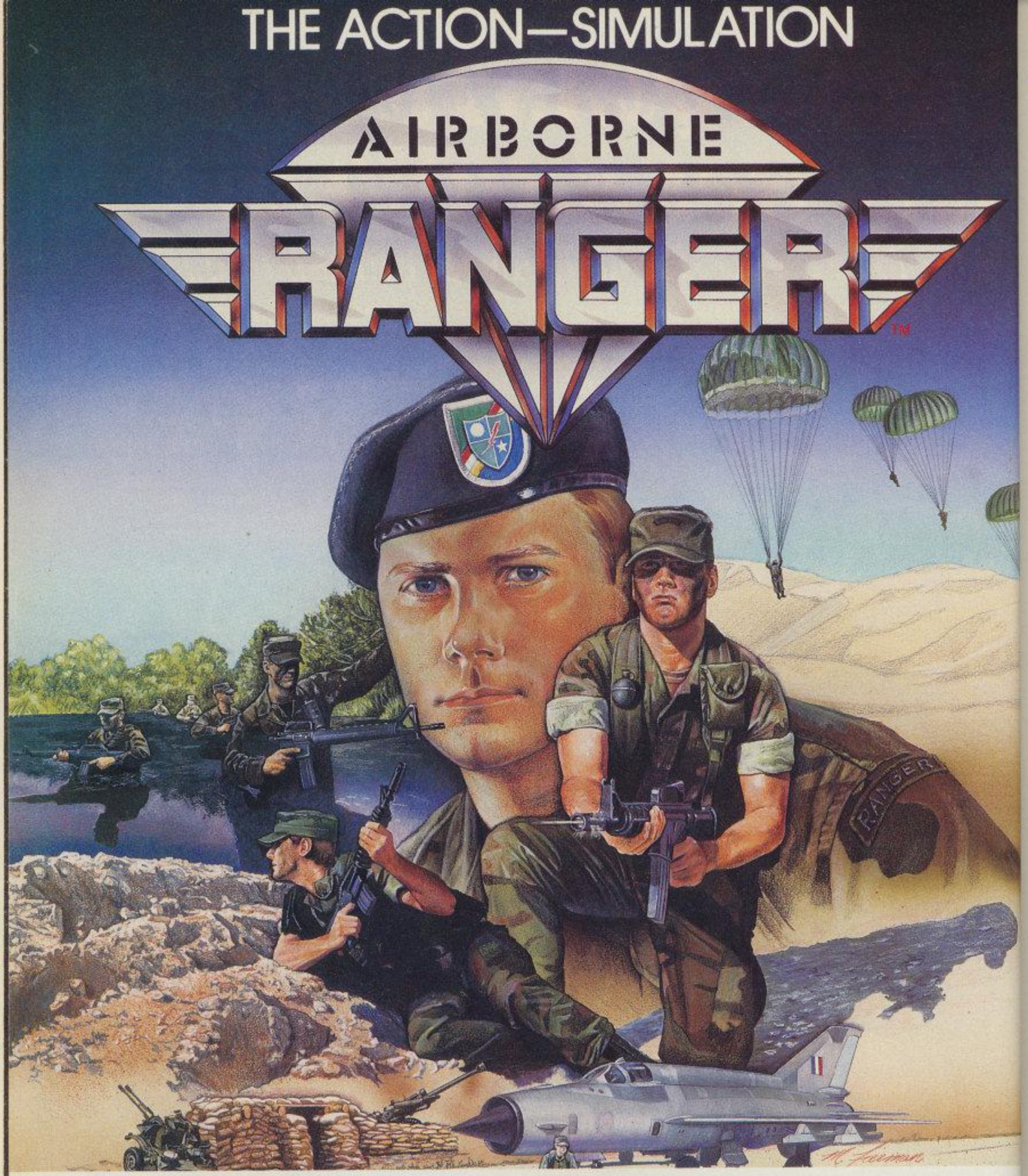
DATEL ELECTRONICS

UNITS 8/9, DEWSBURY ROAD, FENTON INDUSTRIAL ESTATE, FENTON, STOKE-ON-TRENT.

SALES ONLY	TECHNICAL ONLY
0782 273815	0782 202258

THE ACTION—SIMULATION

AIRBORNE RANGER™



You are one of the elite . . . parachuting alone behind enemy lines. The enemy controls the terrain, hidden in bunkers and machine gun nests . . .you may be surrounded. The action is fierce as you control one soldier's battle against overwhelming odds. You'll need skill and strategy to outmanoeuvre your enemy, plus courage and some luck to make your escape. Airborne Ranger is an exciting fast-paced simulation with 12 desperate missions in 3 different regions of the world. The possibilities are endless!

AIRBORNE RANGER. A challenging combination of danger and suspense. Available for the Commodore 64/128K. Cassette £14.95 Disk £19.95.

MICRO PROSE
SIMULATION • SOFTWARE

Please send _____ copy/ies of Airborne Ranger CBM 64/128 ☐ Cassette £14.95 ☐ Disk £19.95 ☐ Further details.

Name (block capitals) _____ Address _____

_____ Post Code _____

I enclose £_____ including 55p P+P. Cheques payable to MicroProse Software Ltd,

or debit my Access/Visa card. Expiry date _____ No. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

MicroProse Ltd., 2 Market Place, Tetbury, Gloucestershire GL8 8DA. UK. Tel: (0666) 54326. Tlx: 43422 MPS/UKG.

BobsTerm Pro

A close look at what could be the ultimate C64 communications program.

By David Janda

BobsTerm Pro (BTP was produced in the United States by Bob Lentini, a leading authority on Commodore communications. The package is being distributed in the UK by Precision Software who are best known for their Superbase and Superscript packages.

To refer to BTP as comms software would be a bit of an insult. BTP is a complete telecommunications environment that incorporates almost every facility you could hope for. I say 'almost' because the package was written for the American market, and as such there are a few facilities that we would not use here in the UK – the Punter file transfer protocol being one example. Having said that, the few inconsistencies that I noticed do not affect the overall performance of the package.

User Friendly

BTP is a complex package, yet easy to use. This is because the author has opted to make BTP completely menu driven. Not the best user interface when compared to something like Amigas Kickstart, but it's very fast and effective in use. All the menus are well laid out and it was immediately apparent that a lot of thought went into the design of the menus. Presenting a screen full of detailed information such as the XMODEM transfer characteristics in a clear, easy to read format is not an easy task, but BTP succeeds in this respect.

The menus are in a hierarchical form with the main menu at the 'top' with sub-menus leading from it. Most of the commands are of the single key type with the letter corresponding to the action, e.g. pressing the Commodore key with E will toggle the echo. There are 19 such commands which are called comkey commands, and pressing 'K' from the main menu will list them with their associated functions.

Features

There are three methods of entering terminal mode in BTP, by pressing 'T' from the main menu, from the auto menu after dialing a number, or from the auto menu in answer mode. Once in terminal mode you are presented with a blank screen with five status lines at the top; the first of which is used to display various comkey settings e.g.:

CR:BFXXXXX:E:LI:LO:C:F:ASC:∧
:0:hh:mm:ss

BF will show how many characters free there is in the buffer (which starts off at 28,500 bytes), E indicates whether echo is enabled and so on. Options that are enabled have their corresponding letters displayed in reverse video, and all the comkey commands are accessed by pressing the Commodore key followed by a letter (Table 1).

The next line consists of 40 dashes or a double row of dashes depending on whether the modem is on or off hook, and the following two lines are used to display various messages when transfering files. If anything drastic happens, such as an aborted file transfer, a flashing message will be displayed on the next line.

Communications is carried out on the following twenty lines by forty characters with the option of entering text in a two line window. This is very handy for those who like to play online adventure games or use real time chat facilities because the entered text will not be broken up by any incoming text.

One comkey command of particular interest is the word wrap feature. When enabled, text entered by the user will be formatted. Likewise, text being sent from the host system will also be formatted and this feature proved to be most useful when using BBs that are set up for 80 column output.

The terminal mode and the rest of BTP has a couple of cosmetic features. If you don't like the character set that is used then you can select another from a choice of seven more, and you have the ability to define your own. The colours used for text, error messages, menus and so forth can all be individually changed as well.

TABLE 1 — COMKEY COMMANDS

A — ASCII/BINARY
B — BUFFER
C — CAPS LOCK
D — DISPLAY TRANSFERS
E — ECHO
F — SCREEN FORMATTING
H — HOOK TOGGLE
I — LINEFEED IN
O — LINEFEED OUT
K — FUNCTION KEY LIST AND EDIT
L — LINE/CHAR ENTRY MODE (TERM MODE)
N — NULL STRIP (TERM MODE)
P — PRINTER ONLINE (TERM MODE)
R — RESET TIMER
S — SET TIME/START-STOP TIMER
T — TIME/TIMER TOGGLE
X — XFER FILES (TERM MODE)
@ — DISPLAY CTRL CHARS
* — CLEAR SCREEN (TERM MODE)

Buffering

Most packages have some sort of buffering facility which can be used to grab text that is being sent from the host system. With BTP the concept of buffering is taken much further. You have the option to SAVE/LOAD to/from disk or RAM, alter the buffer with a complete array of editing commands that would put some word processing packages to shame, and much more. BTP does not limit the buffer to ASCII use only. Basic programs can be automatically converted to ASCII when loaded into memory and sequential listings can be converted into Basic programs. A host of other conversion formats are available, and BTP enables you to define your own!

A detailed spiral bound user guide that's over 100 pages in length describes very clearly every aspect of the package. A section is devoted to each feature and the six page contents ensures easy reference. The guide is roughly divided into three sections; the first part covers getting started (for the impatient), next follows a detailed description of the package and the remainder of the guide covers parameter setting.

Compatibility

Before I detail BTP's features it's worth noting what the package cannot do, and the features that probably will not be of use to UK users.

First, BTP only works with modems that are connected to the user port, or modems that are interfaced with an RS232 converter which in turn is connected to the user port. This rules out the UK Commodore modem (commonly referred to as the Compunet modem). BTP contains a number of 'drivers' and is configured to work with the following modems:

Commodore 1650 Automodem;
Commodore 1660 Modem/300;
Commodore 1670 Modem/1200;
Westridge Modem;
Master Modem;
Mity-Mo Modem;
Hes I and II Modems;
Total Telecom Modem;
Hayes Smartmodem.

Most of the modems listed are not available here in the UK. This is not a problem though as BTP will work with any manual modem that's connected to an RS232 interface. However, unless you have one of the intelligent modems listed, or a Hayes compatible modem such as the Pace Series Four you will not be able to make use of the auto-dial features of the package. Demon/Voyager owners will not be able to auto-dial with BTP as these modems auto-dial by toggling the RTS line which is rather unconventional. Having said this it should be possible to make use of the auto-answer feature of these modems as long as pin eight on the RS232 converter is connected.

BTP allows pulse or tone dialing. The tone dialing feature is created by feeding the autio output of the C64 pack into the modem, but this feature is redundant because the UK System X dial tones are different from those used in the States – enough said.

Two other points worth noting are the Punter file transfer protocol and repeat dialing. BTP provides a number of file transfer protocols from straight ASCII to XMODEM (which is widely used throughout the UK). The Punter protocol is quite common in the US but not so here. However, I understand that a number of European Commodore Bulletin Boards will soon be using Punter, and if you should dial direct to the States it will no doubt be of use!

On a more serious note, BTP allows for repeat dialing. That is, when a number is auto-dialed and the host at the other end of the line does not answer BTP will continuously try the number over and over again. *Your Commodore* would like to point out that it is currently illegal for modems to repeat dial more than four times in succession, and as there is no facility to limit the number of re-dials (a bad point) this feature should be used with caution.

The Clever Stuff

The auto mode in BTP is used with one of the intelligent modems that is supported by BTP or a Hayes

compatible modem. From the auto mode menu you can enter a phone number and BTP will send the necessary command string to the modem to get it to dial the number. In answer mode the package will wait for an incoming call, answer the phone and display a welcome message which can be defined by the user. A neat feature is the ability to set up a password, thus offering a degree of security.

No doubt there are many similar sets of commands that you use when loging onto a BB or database. BTP allows the user to define a series of operations, called macros, that can be executed manually or automatically. Basically, a macro can consist of any BTP command, be it menu level, a comkey command or text that you would enter in terminal mode. The macro facility also has a degree of program control, so it's possible to detect whether certain characters have been sent by the host, and if so perform another set of commands. The macro commands can be executed manually or automatically by setting a time when they should be executed. I had great fun defining a macro to dial Telecom Gold, enter my ID and password, check if there was any mail, spool it to disk if so and log off, or log off if there was none – all done when I was down the pub!

It's not as easy as it sounds though, and I wish BTP had more sophisticated macro commands. As it is, the present commands are rather limited.

As I have mentioned before, BTP is a sophisticated telecommunications package, yet it's easy to use. Even though the package is loaded with features,using it is simplicity itself, and if you use the phone book option which dials a set number each time it is executed things are even easier. For example, from the main menu, connecting to a BB or database can be as little as three key presses away; this ease of use is by far BTP's strongest point. The menu system and excellent manual enabled me to use the package straight away with no problems whatsoever which is ideal in a comms environment. No comms package can offer a set of pre-defined settings that will see you through all possibilities, BTP offers some, but it also allows the use to tailor just about every aspect to their own requirements and save them as default settings.

In simple terms, BobsTerm Pro is the best piece of terminal software I have used on the Commodore 64. Its powerful features match and supersede those found on many professional PC based comms packages, and at £24.95 it represents excellent value for money. VG

Touchline:
Name: *BobsTerm Pro.* ***Supplier:*** *Precision Software Limited, 6 Park Terrace, Worcester Park, Surrey KT4 7JT.* ***Tel:*** *01-330 7166.* ***Machine:*** *C64/128.* ***Price:*** *£24.95.*

I·C·P·U·G

the Independent Commodore Products Users Group is the largest and most friendly computer club in the country

- **Many local groups with regular meetings**
- **Superb FREE Newsletter – 80 plus pages of reviews, news and information every two months**
- **We support all Commodore Machines old and new: PET, VIC20, 64, 16, +4, PC, 128 and AMIGA . . .**
- **Free Software Library of public domain programs for all the above machines available to members on supply of blank disk or tape and payment of p&p**
- **Help and Advice**
- **Discount scheme**
- **Subscription only £10 per year (UK) plus £1 joining fee**

If you are seriously interested in using or programming any Commodore computer, then joining ICPUG is a must!
For full details, send a stamped, addressed envelope to:

ICPUG Membership Secretary, Jack C. Cohen, 30, Brancaster Road, Newbury Park, Ilford, Essex, IG2 7EP

TELETEXT

A world of information at your fingertips

The Microtext adaptor turns your C64 or C128 into a sophisticated Teletext Receiver. Giving you full colour display of any of the free pages from Ceefax or Oracle. As well as news and sports results, there is road, rail and air travel information, whats on TV and weather reports. You can get an update on share prices or bargain holidays. And not only does Teletext cater for special interests, like computing, motoring, or gardening, but you'll also find things to do and places to go in your area, prize competitions and even your daily horoscope, plus much much more. It's all free, easy to use and it's all at your fingertips.

A page like a recipe or a weather map may be saved to disc or cassette or even printed out and the manual has examples and shows how to access and use Teletext from your own programs, the ability to use live information like football results, exchange rates or weather conditions, provides possibilities limited only by your imagination.

The adaptor fits neatly on the user port of the Commodore. A lead goes to the 'VIDEO OUT' socket of your video recorder so using your Video as the Tuner for the system.
Just **£69.95 inc P&P** (Overseas add £2.00)

"I wouldn't hesitate to recommend this to anyone"
— Your Commodore Jun 87

MICROTEXT TUNER NOW AVAILABLE

Our own Tuner has been specially designed to provide the signal that the Adaptor needs, thus eliminating the need for a video recorder. Just plug in an aerial, it tunes itself in (!) and channels are selected from the keyboard. The whole system consists of a Microtext Adaptor, Tuner, Power supply, lead and manual and costs just **£114.80 inc P&P** (128D cersion add £8.50)
Only from:-

MICROTEXT

Dept YC, 7 Birdlip Close, Horndean, Hants. PO8 9PW
Telephone: 0705 595694

Sprite Library

Continuing our Sprite Library series, this month we look at the ways of producing different types of vehicles.

By Mike Benn

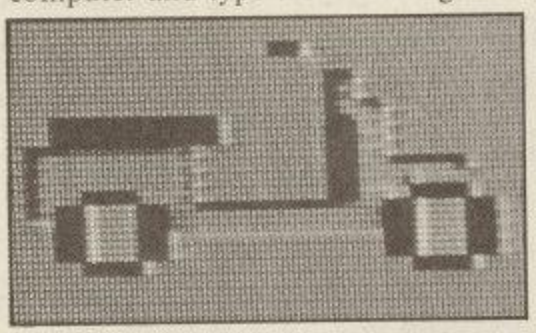
This month's addition to the Sprite Library will be helpful in the area of scrolling backdrops. The vehicles listed in the table require multi-colour mode and each definition needs two sprites per vehicle. Each vehicle is made up of four blocks of sprite data – the first pair being a side view and the second pair depicting a birds eye view. All the traffic faces right so if you need any of the vehicles facing left they will need to be manipulated by a suitable sprite editor.

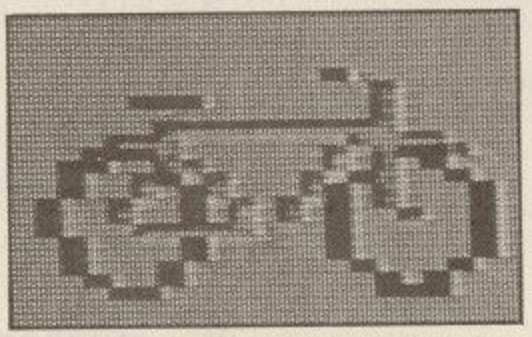
Table (Vehicles – Multi-colour)

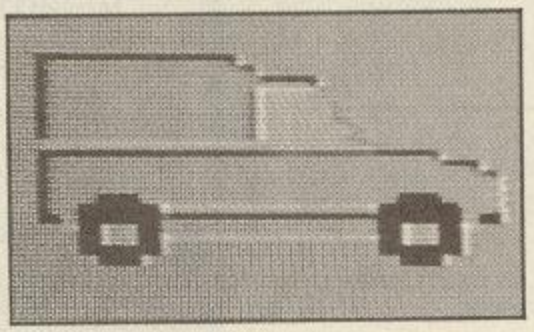
Hex	Decimal	Description
A0-A3 /	160-163	Bicycle
A4-A7 /	164-167	Tandem
A8-AB /	168-171	Scooter
AC-AF /	172-175	Motorcycle
B0-B3 /	176-179	35 CWT Van
B4-B7 /	180-183	Light van
B8-BB /	184-187	Land Rover
BC-BF /	188-191	Light pickup
C0-C3 /	192-195	Jeep
C4-C7 /	196-199	Estate car
C8-CB /	200-203	Small hatch-back
CC-CF /	204-207	Saloon car
D0-D3 /	208-211	Sports car
D4-D7 /	212-215	Porsche
D8-DB /	216-219	Racing car
DC-DF /	220-223	Taxi cab

Getting it all in

Type in the basic loader as published and *save it-don't run it* or it will self-destruct. Before running the loader program you will need to reset the computer and type the following:







POKE43,0:POKE44,64:POKE16384, 0:NEW and press return. This will trick the computer into believing that the Basic now starts at $4000 instead of $0801. Load in the Basic loader and run it; if error free, the program will automatically save itself as a block of data. If you reload that data in the future remember to add a 1 after the device number. The data is saved in the following location $2800-$37FF.

The sprites run from 160 to 223 in a compromise to avoid the area of $2000 traditionally set aside for redefined character graphics and to avoid the need of typing in line after line of data.

If only one or two sprites are required then use this formula: < Sprite block No.-160 > *40 + 190= the data line number at which that sprite blocks data starts. Remember to type in the following three lines of data and alter the variable BL to the number of data lines you have in your finished program, less 1.

The small basic program Vehicles Display will print the sprites variously in expanded form on the screen in both side and top views simultaneously. To hold on any sprite enter the same number for Start and End.

Any Sprite Editor program will enable you to change and adapt the individual sprites to your own requirements. YC

See listings on page 77.

DATEL ELECTRONICS

3 SLOT MOTHERBOARD

wear and tear on your ansion Port

- epts 3 cartridges.
- tch in/out any slot.
- ly buffered.
- Onboard safety fuse.
- High grade PCB.
- Reset button.

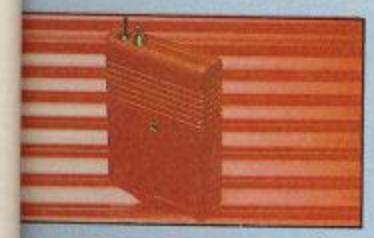
ONLY £16.99

DATA RECORDER

ality Commodore compatible data recorder.

- se control.
- nter.
- Suitable for 64/128.
- Send now for quick delivery.

ONLY £24.99



SMART CART ™

you can have an 8K or 32K ridge that you program like f then acts like ROM!

- or 32K pseudo ROM.
- ttery backed to last up to 5 years (lithium y).
- mply load the program you require – then he switch. The cartridge can then be ed just like a ROM cartridge.
- kes your own cartridges including autostart – without an EPROM burner.
- n be switched on or off board via software.
- 2 slot open for special programming iques.
- K version has 4 x 8K pages.
- me knowledge of M/C is helpful – but full uction are provided.

K VERSION £14.99
K VERSION £29.99

SMARTCART UTILITIES

es of utility programs for use with Smartcart. load in the program and you have a ful cartridge. When you have a different ement – load in another program and you a new cartridge. The process takes seconds. an be repeated any number of times.

ntend to release a range of grams. The first available are:

DISKMATE II

the features of Diskmate II (see ad).

led in seconds – with full ructions. **ONLY £9.99**

PRINTER IV

Now you can turn your MPS 801 into 4 printers in one!!

- Alternative character set ROM – fitted in seconds.
- All four sets have true descenders.
- 100% compatible with all software.
- Descender.
- Eclipse.
- Scribe.
- Future.
- Choose any set at the flick of a switch.

"For anyone who uses their printer often this chip is a must. It's quick and easy to use and the end results are impressive" – Your Commodore, Jan 87.

ONLY £19.99

TURBO ROM II

Turbo Rom II is a replacement for the actual kernal inside your 64. It provides superfast load/save routines.

- Loads most programs at 5-6 times normal speed.
- Saves at 5-6 times norinal.
- Improved DOS support including 10 sec format.
- Programmed function keys:- load, directory, old, etc.
- Return to normal kernal at flick of a switch.
- FCOPY – 250 block file copier.
- FLOAD – special I/O loader.
- Plus lots more.
- Fitted in minutes – no soldering usually required. (On some 64's the old ROM may have to be desoldered).

ONLY £14.99

BLAZING PADDLES

A complete lightpen/graphics illustrator package.

- A fully icon/menu driven graphics package of a calibre which should cost much more.
- Complete with a fibre optical lightpen system for pin point accuracy.
- Multi feature software including:
  - Range of brushes
  - Airbrush
  - Rectangle
  - Circle
  - Rubberbanding
  - Lines
  - Freehand
  - Zoom mode
  - Printer dump
  - Load/save
  - Advanced colour mixing – over 200 hues!!
  - Cut and paste allows shapes/windows/pictures to be saved to/from tape/disk.
- Blazing Paddles will also work with many other input devices including; Joysticks, Mice, Graphics Tablets, Trackball etc.
- Pictures can be saved from Action Replay and edited with Blazing Paddles.

Complete Blazing Paddles & Lightpen **ONLY £24.99**

Blazing Paddles available separately for **£12.99**

TOOLKIT IV

The ultimate disk toolkit for the 1540/1541

- A disk toolkit is an absolute must for the serious disk hacker. Tbolkit IV has more features than most for less.
- DISK DOCTOR V2 – Read and write any track and sector including extra and renumbered tracks. Repair damaged sectors. Look underneath read errors.
- HEADER/GAP EDITOR – Decodes and displays ALL header information including off bytes and header gap. Rewrite the entire header and header gap. Renumber sectors. Also edit any sector tail gap.
- DISK LOOK – Sort directory. Recover lost files. Display file start/end addresses. Disassemble any file program directly from the disk to SCREEN or PRINTER including undocumented opoodes. Edit Bam. Much, much more.
- FILE COMPACTOR – Can compact machine programs by up to 50%. Saves disk space. Compacted programs run as normal.
- FAST DISK COPY – Copy an entire disk in 2 minutes or less using single 1541.
- FAST FILE COPY – Selective file copy. Works at up to 6 times normal speed.
- FORMATTER – 10 second format an entire disk or format any individual track or half track 0 to 41. Redefine any of 30 parameters to create or recreate unique disk formats.
- ERROR EDIT – Quickly find and recreate all read errors including extra and renumbered tracks or sectors and half tracks from 0 to 41. Even recreates data under errors and allows you to redefine any necessary parameters.

ONLY £9.99

RAM DISK

- Turn your Smart Cart into a 32K RAM/disk.
- 32K of instant storage area for files/programs.
- Load/save instantly.
- Disk type commands: load, save, directory, scratch.
- Program data retained when computer is switched off!
- Full command set with instructions.

ONLY £9.99

ROBOTEK 64

Model & Robot Control made easy

- Robotek 64 is a comprehensive hardware/software package which enables you to connect your 64/128 to the outside world.
- 4 output channels – each with onboard relay
- 4 input channels – each fully buffered TTL level sensing.
- Analogue input with full 8 bit conversion.
- Voice input for voice control.
- Software features:- test mode/analogue measurement/voice activate/digital readout etc.
- Excellent value! **ONLY £39.99**

including hardware/software/ mic etc. (State tape or disk)

DIGITAL SOUND SAMPLER

- The new sampler allows you to record any sound digitally into memory and then replay it with astounding effects.
- Playback forwards/backwards with echo/ reverb/ring modulation etc.
- Now with full sound editing module to produce outstanding effects.
- Full 8 bit D to A and ADC conversion.
- MIDI compatible with suitable interface. (I.e. Datel unit for £29.99, see ad).
- Live effects menu includes real time display of waveforms.
- Line in/mic in/line out/feedback controls.
- Powerful sequencer with editing features.
- Load/save sample.
- Up to 8 samples in memory at one time.
- Tape or disk (please state).
- Complete software/hardware package **£49.99**
- Com-Drum software is available separately at **£9.99** to turn your Sampler II into a Com-Drum system as well as a sampling system.

COM-DRUM

Digital Drum System

- Now you can turn your computer into a digital drum system.
- Hardware/software package.
- 8 digital drum sounds in memory at one time.
- Complete with 3 drum kits.
- Real drum sounds – not synthesised.
- Create superb drum rhythms with real and step time.
- Full editing.
- Menu driven.
- Output to hi-fi or through tv speaker.
- Load/save facilities.

ONLY £29.99 (state tape or disk)

COM-DRUM EDITOR

- 24 drum sounds supplied on disk to enable you to construct your own drum kit.
- Re-arrange sounds supplied with a Com-Drum to make new kits.
- With sound sampler hardware you can record your own kits.
- Load/save facilities.

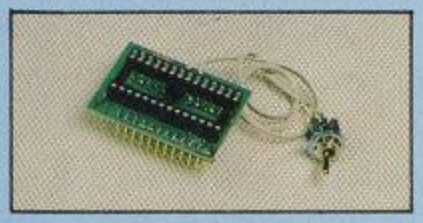
ONLY £4.99 disk only

DATEL ELECTRONICS

256K SUPEROM EXPANDER

- ❑ Now you can select from any of 8 32K EPROMs instantly.
- ❑ 8 sockets to accept upto a 32K EPROM in each.
- ❑ On board operating system – no programs to load.
- ❑ Program your own EPROMs using our EPROM programmer.
- ❑ No need to have loads of cartridges – just make a selection from the Superom menu.
- ❑ Directory of utilities on power up.
- ❑ Fully menu driven on power up.
- ❑ Select any slot under software controls.
- ❑ Unique EPROM generator feature will take your own programs – basic or m/c and turn them into autostart EPROMs. (EPROM burner required).
- ❑ Accepts 2764/27128/27256 EPROMs.
- ❑ On board unstoppable reset.

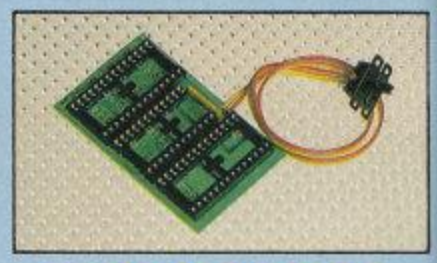
ONLY £29.99



4 WAY KERNAL BOARD

- ❑ This board fits in place of the kernal in your 64 and accepts a 16K or 32K replacement kernal giving 2 or 4 different operating systems.
- ❑ Just flick the switch supplied to select between systems.
- ❑ This is a carrier only – ready to accept your own chip.
- ❑ Now you can have all your different systems available at one time.
- ❑ Full instructions. ❑ Fitted in minutes.

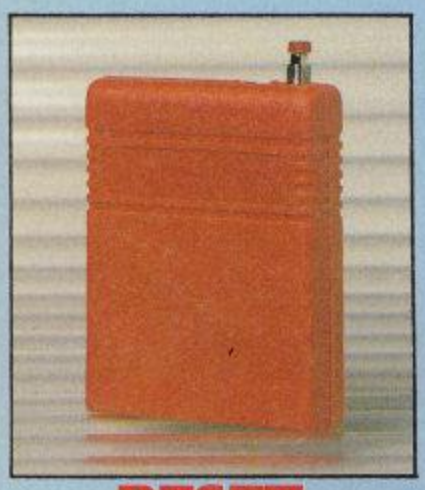
ONLY £8.99



5 WAY KERNAL EXPANDER

- ❑ A multi carrier board accepts up to 3 chips.
- ❑ Fits in place of original kernal of 64.
- ❑ Three sockets – one for the original kernal plus two others each accepting a 16K chip – that's 5 operating systems available at the flick of a switch!
- ❑ Fitted in minutes.
- ❑ Full instructions.

ONLY £12.99



RESET CARTRIDGE

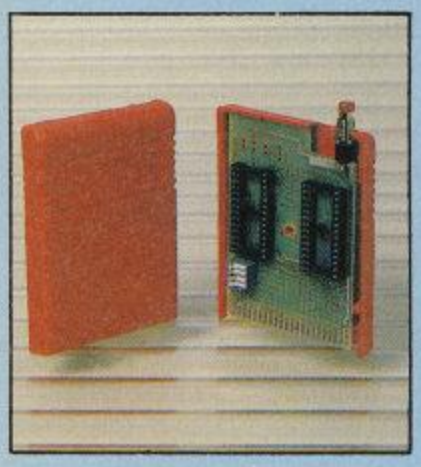
- ❑ Unstoppable reset button.
- ❑ Resets even so called "unstoppable" programs.
- ❑ Add pokes from magazines etc.
- ❑ Fits in cartridge port.
- ❑ Simply plug in.

ONLY £5.99

QUICKSHOT TURBO™

- ❑ Top quality fast action.
- ❑ Top & trigger fire buttons.
- ❑ Rapid fire/auto action.
- ❑ Suction feet for one handed action.
- ❑ Extra hardwearing.

ONLY £12.99 for 64/128
ONLY £13.99 for C16



QUICKSHOT II

- ❑ World's top selling joystick.
- ❑ Top & trigger fire buttons.
- ❑ Rapid fire control.
- ❑ Suction feet.

ONLY £7.99 for C64/128
ONLY £8.99 for C16

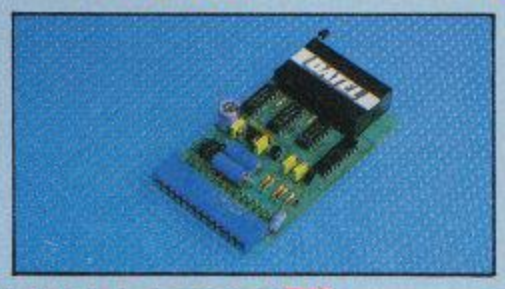
DEEP SCAN BURST NIBBLER™

- ❑ The most powerful disk nibbler available anywhere, at any price!
- ❑ Burst Nibbler is actually a two part system – a software package **and** a parallel cable to connect the 1541/1570/1571 to 64/128 (state type).
- ❑ What gives Burst Nibbler its power? Conventional nibblers have to decode the data from the disk before it can transfer it using the serial bus – when non standard data is encountered they are beat. Burst Nibbler transfers data as raw GCR code via the parallel cable without the need to decode it so you get a perfect copy of the original.

● Will nibble upto 41 tracks. ● Copy a whole disk in under 2 minutes. ● Full instructions.
● Regular updates – we always ship the latest. ● Fitted in minutes – no soldering usually required.
● Full or ½ tracks. ● No need to buy parallel cable if you have Disk Demon/Dolphin etc.
● Cable has throughbus extension for other add ons.

- ❑ Whether to choose FastHack'em or Burst Nibbler? Fast Hack'Em is unbeatable value as an "all-rounder" – with nibblers, 1 or 2 drive copy, format, file copy, 1571 copy etc. etc., so if you have a more general requirement perhaps FastHack'Em is for you. Burst Nibbler is a pure nibbler second to none, for the reasons stated. So if it's just making backups you are interested in, there is no other product to beat it.

ONLY £24.99 COMPLETE
SOFTWARE ONLY £12.99 CABLE ONLY £14.99



EPROMMER 64™

- ❑ A top quality, easy-to-use EPROM programmer for the 64/128.
- ❑ Fully menu driven software/hardware package makes programming/reading/verifying/copying EPROMs simplicity itself.
- ❑ Will program 2716, 2732, 2764, 27128 and 27256 chips. 12.5, 21 or 25 volts.
- ❑ Fits into user port for maximum compatibility with cartridges/Superom Board etc.
- ❑ Full feature system – all functions covered including device check/verify.
- ❑ We believe Eprommer 64 is the most comprehensive, most friendly and best value for money programmer available for the 64/128.
- ❑ Ideal companion for Superom Board, Cartridge Development System, our kernal expanders or indeed any EPROM base project.
- ❑ Comes complete with instructions – plus the cartridge handbook.

ONLY £39.99 COMPLETE

16K EPROM BOARD

- ❑ Accepts 2 x 8K EPROMs.
- ❑ Switchable to configure as 2 x 8K or 16K or off.
- ❑ On board unstoppable reset.
- ❑ Full instructions.

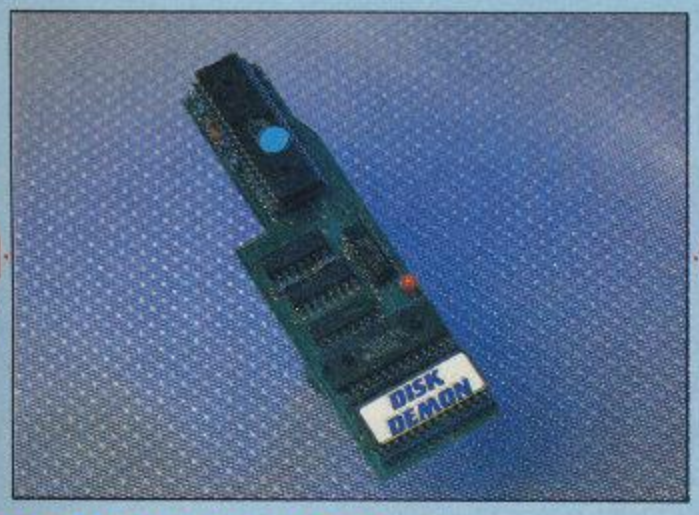
ONLY £8.99

DISK NOTCHER

- ❑ Quickly and easily double your disk capacity.
- ❑ Use both sides of your disks.
- ❑ Simple to use.
- ❑ Takes seconds.

ONLY £4.99

DATEL ELECTRONICS



PROFESSIONAL DOS ™ MIKROTRONIC

£64.99 POST FREE with Disc Demon operating system

"The world's fastest parallel operating system"

- ❑ Loads a typical 202 block program file in under 3 seconds!
- ❑ 60x faster load (PRG files).
- ❑ 25x faster load (SEQ files).
- ❑ 20x faster save (PRG files).
- ❑ 20x faster save (SEQ files).

PLUS AN ADVANCED COMMAND STRUCTURE INCLUDING:

- ❑ Fast format – up to 40 tracks (749 blocks).
- ❑ 16 function keys: list, run, load, directory, format, save, old, verify, etc.
- ❑ Fload will fastload files up to 250 blocks (other similar systems will only cope with 202 blocks).
- ❑ Number conversion. ❑ Reset.
- ❑ Unique built in file copier will copy files up to 250 blocks like lightning – multiple copy options – perfect for copying Action Replay files.
- ❑ Highly compatible with commercial software – can be switched out for non compatible programs.
- ❑ Perfect for use with Action Replay 3 – a typical AR3 backup will reload in about 3 seconds – yes 3 seconds!
- ❑ Speeds up other DOS functions including verify, scratch etc.
- ❑ Comes complete with superfast file and whole disk copier free!
- ❑ Screen on or off during loading.
- ❑ Enhanced command set – over 30 new commands.
- ❑ Easily fitted – Disk Demon plugs inside the 1541 and the new operating system chip plugs inside the C64/128. Fitting takes only minutes and usually requires no soldering.
- ❑ User port throughbus supplied free – you could pay £15.00 for this alone.
- ❑ Supplied complete – no more to buy.
- ❑ Works on C128/1541 in 64 or 128 mode.

C128 version

£69.99

BLUE CHIP DRIVE ● Fully C64/128 compatible.

- ❑ At last a top quality drive at a sensible price.
- ❑ Super slimline case
- ❑ External power supply for cool operation
- ❑ Direct drive motor
- ❑ Supplied complete with all cables – no more to buy.
- ❑ This drive is now probably the most compatible drive available for the Commodore. More so than even Commodores own '1541C. Much more so than other so called compatibles. In fact we have been unable to find a program including the latest that would not work. (At time of Press).
- ❑ **No need to look elsewhere – this is the best.**

ONLY £139.99 POST FREE
(If you require courier delivery add £5.00).

ULTRA CRUNCHER

● The ultimate cartridge based program compactor.

- ❑ Compacts by upto 30%!
- ❑ More programs for disk.
- ❑ 3 compacting programs on one cartridge.
- ❑ Fast loading/saving routines – works with Disc Demon.
- ❑ Can even further compact AR III files!
- ❑ 250 block file copy function.
- ❑ Full DOS support including fast format.

ONLY £12.99 on cartridge.
Available as chip only for 256K Superom Board for only £7.99

FAST HACK'EM ™

● Multi Module Disk Nibbler – all on one disk.

- ❑ Single 1541 Nibbler – Copy a disk in 2 minutes.
- ❑ Auto Nibbler – Copy an entire protected disk in 3 minutes.
- ❑ Super fast File Copy – Under 9 seconds typically.
- ❑ Copes with Fat Tracks.
- ❑ Superfast Copy – Entire disk in 36 seconds with verify.
- ❑ Twin Drive Copier – Even faster!
- ❑ Plus unique "Parameters" mode. These files "Unlock" the more heavily protected programs with a parameter for a particular brand or even single program.
- ❑ **No other product is such a good "All Rounder" at this price its unbeatable.**

ONLY £9.99 POST FREE

DISKMATE II

The Disk Utility Cartridge

- ❑ Disk fastload cartridge.
- ❑ Up to 5 times faster.
- ❑ Fast save. ❑ Fast format (10 secs).
- ❑ Improved DOS – single stroke commands – load/save/dir/old etc.
- ❑ Redefined function keys for fast operation of common commands.
- ❑ Powerful toolkit commands including: old/delete/merge/copy/append/autonum/linesave etc.
- ❑ Plus a full machine code monitor – too many features to list but it has them all!
- ❑ Special switching techniques make Diskmate invisible to the system. Therefore it is a more compatible fastloader than other types.
- ❑ Diskmate II is

ONLY £14.99

MIDI 64

A Full Midi Interface for the 64/128 at a realistic price

- ❑ MIDI in. ❑ MIDI thru. ❑ 2 x MIDI out.
- ❑ Compatible with most leading software packages including: Seil, JMS, Advanced Music System, Joreth, Steinburg etc.

ONLY £29.99

MOUSE

- ❑ CBM 64/128 mouse.
- ❑ Wide compatibility with software including: Blazing Paddles.
- ❑ Works by mimicking joystick so will work in any joystick application including graphic packages only designed for joystick.
- ❑ Functions on either joystick port.
- ❑ Optical system operation.

ONLY £24.99

CHIPS

- ❑ 27128 **£3.00 EACH**
- ❑ 27256 **£4.50 EACH**

CARTRIDGE DEVELOPMENT SYSTEM

- ❑ All the necessary parts to produce an 8K/16K auto-start cartridge.
- ❑ Top quality PCB. ❑ Injection moulded case.
- ❑ Reset switch. ❑ 16K EPROM.
- ❑ "Cartridge Handbook" gives full details and tips on building and configuring the cartridge for many uses.

ONLY £12.99
complete with handbook

ALL ORDERS NORMALLY DESPATCHED WITHIN 48 HRS

HOW TO ORDER . . . .

BY PHONE	BY POST	BY PRESTEL/FAX
0782 273815 24 hr Credit Card Line	Send cheques/POs made payable to 'Datel Electronics'	Prestel Pages # 258800008 Fax Orders 0782 264510

DATEL ELECTRONICS

UNITS 8/9, DEWSBURY ROAD, FENTON INDUSTRIAL ESTATE, FENTON, STOKE-ON-TRENT. TELEX:

SALES ONLY	TECHNICAL ONLY
0782 273815	0782 202258

Bothersome Basic

The old truism garbage in, garbage out is still relevant today, especially when using the INPUT command.

By Norman Doyle

One of the most common reasons why a program crashes is through unexpected responses when the user has to input some data through the keyboard. Trapping these unorthodox entries not only calls for an alert programming mind but also for a rethinking of the whole situation.

The problem with the Basic INPUT command is that it runs according to its own rules. This is fine if the users understand what these conditions are but not very forgiving if they don't. If the input is stored as a string variable the problems are easily rectified but using a numerical variable causes real problems.

String inputs which take up less than two screen lines will rarely cause problems as long as the string does not include a comma or a colon. Either of these symbols act as a terminator and only that part of the entry before the first occurrence of one of these symbols will be accepted as input, the rest is ignored. The computer responds to an incomplete acceptance of the attempted input with a rather unfriendly EXTRA IGNORED message.
A simple program such as;

```
10 INPUT"ENTER MESSAGE": A$
20 ?A$
```

would respond to an input such as:

```
I,MASTER OLIVER TWIST, WANT
MORE
```

in the following way:

```
?EXTRA IGNORED
I
```

If the user made a mistake and went berserk with the delete key so as to totally erase the ENTER MESSAGE prompt, further chaos would result with the following response:

```
?EXTRA IGNORED
R TWIST
```

The part typed over where the original prompt was up to the cursor's old starting position has been ignored, as well as the extra piece after the comma.

The number of characters typed as an input can also cause problems. If the input continues beyond two screen lines and onto a third, only the characters on the third line will be accepted and no error message will appear.

The only way around this is to get confirmation of each entry with a check routine such as:

```
10 INPUT"ENTER MESSAGE",A$
20 ?"PLEASE CONFIRM THAT
   YOUR MESSAGE WAS:":?
30 ?A$:?
50 ?"PRESS 'Y' OR 'N' "
60 GET R$:IF R$="Y" GOTO 90
70 GET R$="N" GOTO 10
80 GOTO60
90 REM REST OF PROGRAM
```

Of course this only confirms or denies that the entry was correct. A total novice might keep trying to type in the same message until boredom and frustration sets in. The only foolproof way out is to give specific details of what can and can't be done when an error is confirmed. Quite a painful and dull way to write an interactive program.

As if this wasn't bad enough, numerical variables can be worse! At least the incorrect string inputs don't result in the termination of the program. With an interactive maths program it's always tempting to enter very large numbers. Try entering a vast number into this program:

```
10 INPUT"ENTER A NUMBER":A
20 ?A
```

As the number increases it is eventually treated as an exponential value such as 1.2345E+30. If this exceeds the maximum number that the computer can deal with (1.70141884E+38), an OVERFLOW IN LINE 10 error will be generated and the program will crash out and return to

the READY prompt and direct keyboard control. Not very impressive in a complex accounts program.

This can only be avoided if the number is entered as a string such as A$ and then evaluated and stored as a numerical variable, A, after complex processing. There must be a better way!

The best way, though long winded, is to use the GET command and build a string character. In this way *you* decide which characters may be entered.

First of all a suitable prompt message and a GET loop must be set up:

```
10 ?"ENTER MESSAGE: ";
20 GET A$:IF A$=""THEN 20
```

Now we need to print the characters on the screen as each is typed in and to store them as a separate string, B$:

```
5 B$=""
100 ?A$;:B$=B$+A$:GOTO 20
```

The difficult part is deciding which characters will be accepted and which will be rejected. First we'll assume that the message is going to be a mixture of numbers and letters (alphanumeric characters).

Every letter and number has a value assigned to it under a system known as ASCII (the American Standard Code for Information Interchange). CBM has its own version of this which is officially called Commodore ASCII (pronounced *askey*) but has commonly become known as PETASCII after Commodore's old range of computers which first used this system.

Under this system the numbers zero to nine have values from 48 to 57 and 'A' to 'Z' have values ranging from 65 to 90. The numbers 58 to 64 cover such things as the question mark, semi-colon and colon, so to make things simple, we may as well include those in acceptable range. Thus we get a range of 48 to 90.

This range does not include some other useful punctuation marks such as the comma, full stop or exclamation mark, nor does it include the value of 32 which represents a space. Fortunately these can all be incorporated by stretching the lower limit down to 32.

At this point we can use the *greater than* and *less than* facilities as follows:

```
80 IF A$< CHR$(32) AND A$ >"Z"
   THEN 20
```

This means that each character is checked to see if its ASCII value lies between 32 and 90, if not it is rejected and the program leaps back to get another keypress.

With the program as it stands B$ can be stretched to hold 255 characters and no more. We need a delimiter which will stop any user from trying to type in more than that number:

```
90 IF LEN (B$)=255 THEN
   ?:?"MESSAGE TOO LONG.
   PLEASE TRY AGAIN":GOTO 5
```

There are kinder ways to do this but that will be covered in a later article.

The routine so far will work as long as the user types in the message correctly. What if a mistake is made?

First we must check for a DEL keypress. To jump to the routine for deleting the last letter from B$ and from the screen. Even the DEL key has a value assigned to it and this is 20.

If you enter ?CHR$(90), a 'Z' will be printed on the screen, similarly CHR$(20) will cause a deletion of a character. So we can easily complete one of the demands of correcting a mistake by using the CHR$ command:

```
30 IFA$ < >CHR$(20) THEN 70
50 ?CHR$(20);
```

Obviously this deals with the screen but what about B$? It has to be dealt with using the string manipulation commands. What we need is to keep the left-hand side of B$ and disguard the last letter. Putting it another way we reduce the length, LEN(B$), by one. LEN(B$)=LEN(B$) -1 is an illegal command but

```
60  B$=LEFT$(B$,LEN(B$)-
        1):GOTO 20
```

will do the trick until LEN(B$)=0. A string cannot have a negative length and an error message would be generated if nothing were done. To trap this problem the following line will act as a filter:

```
40 IF LEN(B$)=0 THEN 20
```

The final stage of the line input routine is to check for a carriage return, ASCII 13, and exit to the rest of the program:

```
70  IF A$=CHR$(13) GOTO 110
110 ?:?B$:?LEN(B$)
```

Although this is better than the normal INPUT command, it's not perfectly foolproof and it does take up a lot more space than the normal input procedures. This can be compensated for by parameter swapping. As you can see from the slightly modified Listing 1, the routine is set up as a subroutine. If the main program avoids using the parameters mentioned (A$,B$) you can GOSUB to this routine. On RETURNing B$ can be simply renamed with a command such as NEWNAME$=B$ and the routine can then be called again for the next input later on.

For numbers the acceptable range needs only to be ASCII 48 to 57 with special allowances if decimal points, currency symbols or arithmetical operators are expected.

Evaluation of B$ would be a conversion to a numerical variable after first shortening the string to a manageable length for the computer to deal with. This is rather like deciding how many significant figures, and hence the degree of accuracy, of a calculation. In this way numbers in excess of 1.70141884E+38 can be rejected before the program tries to use them and subsequently crashes out.

The Deep End

For the more accomplished, the INPUT command can be forced to accept colons and commas by skillful trickery. Before using the INPUT command, quotation marks are placed in the keyboard buffer as though they had been typed there.

To do this ASCII 34 is poked into the first buffer byte at 631 and the buffer queue at 198 is informed that there's one character already waiting there. When the INPUT command is executed, the quotation mark is printed alongside the input question mark.

```
10 POKE 631,34:POKE198,1
20 INPUT"ENTER MESSAGE":A$
30 ?A$
```

I regret that I cannot answer your problems by phone but if you have any queries about Basic routines or about these articles, please send them to Bothersome Basic, Your Commodore, 1 Golden Square, LONDON W1R 3AB enclosing an sae and any relevant printouts or recordings. YC

GEOS INSIDE and OUT

A thorough guidebook to effectively using GEOS, whether you are a beginner or a seasoned user. Topics covered include geoWrite & geoPaint applications, a utility to convert your own programs to GEOS format and create custom icons, creating custom windows, details of GEOS file format, a digital display clock and a single step simulator to display GEOS memory locations and registers. 293 pages.

Price: **£12.95**

Optional diskette **£5.00**

NEW

GEOS TRICKS & TIPS

A collection of helpful hints and techniques with easy to understand explanations. Revised to cover GEOS 1.3. Includes a font editor to create up to 64 point text and a machine language monitor. 265 pages.

Price: **£11.95**

Optional diskette **£5.00**

SPECIAL OFFER: Both GEOS books for £22.50

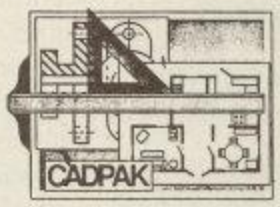
CADPAK Enhanced Version!

For C-64 or C-128

ONLY AVAILABLE ON DISK

CADPAK is a superb tool for computer aided design and drawing. Using either the keyboard or optional lightpen you draw directly on the screen to create and edit pictures, drawings, layouts and renderings—quickly, accurately, creatively. The new *dimensioning* feature allows exact scaled output on your designs. Choose from the menu options and draw on the screen at an exact location using our *AccuPoint* cursor positioning. Using the two graphics screens, you can draw LINE's, BOXes, CIRCLEs, ELLIPSESs; fill with solid colors or patterns; freehand DRAW; COPY sections of the screen; ZOOM-in to do detailed design on a small section of the screen. With CADPAK's improved object editor, you can define and save furniture, electronic circuitry or machinery as intricate as the screen resolution permits. Hard copy to most dot matrix printers. Perfect for all your design needs.

For C-64 **£24.95**
For C-128 **£34.95**



Cadpak-64 + Mouse	**£49.95**
Cadpak-128 + Mouse	**£59.95**
Upgrade Disk	**£5.00**
Upgrade Disk + Mouse	**£29.95**
(Return Original Disk)	

LIGHTPEN (standard version) **£12.95**
(1901 or green screen monitor) **£14.95**
Commodore 1351 Mouse **£29.95**

The C64 version works at 320x200 resolution with hardcopy to most printers in single or double size. The C128 version works at 640x360 resolution, though an 80 column monitor is not required. Hardcopy various sizes.

NEW - Both CADPAK packages now include versions to work with the Commodore 1351 mouse (no other mouse is suitable).

ADAMSOFT, (Dept YC), 18 Norwich Avenue, Rochdale, Lancs. OL11 5JZ.
ACCESS orders accepted by telephone 0706-524304.

STORT SOFT

MAIL ORDER SPECIALISTS

INCREDIBLE LOW PRICES!

ALL DISKS CARRY A NO QUIBBLE REPLACEMENT GUARANTEE ARE CERTIFIED 100% ERROR FREE & COME WITH LABELS, 5 1/4" ALSO HAVE SLEEVES & WRITE PROTECTS. FLIP SIDED DISKS HAVE 2 INDEX HOLES AND 2 NOTCHES.

SPECIAL OFFER!	
25 SS 48TPI 5.25" DISKS & 100 CAP LOCKING DISK BOX	16.00
50 SS 48TPI 5.25" DISKS & 100 CAP LOCKING DISK BOX	25.00
100 SS 48TPI 5.25" DISKS & 100 CAP LOCKING DISK BOX	39.95
25 DS 48TPI 5.25" DISKS & 100 CAP LOCKING DISK BOX	17.00
50 DS 48TPI 5.25" DISKS & 100 CAP LOCKING DISK BOX	26.50
100 DS 48TPI 5.25" DISKS & 100 CAP LOCKING DISK BOX	42.00
3.5" SPECIAL OFFERS	
25 SS/DD 135TPI(MF1DD) & 80 or 60/90 LOCKING DISK BOX	35.00
50 SS/DD 135TPI(MF1DD) & 80 or 60/9/ LOCKING DISK BOX	59.95
25 DS/DD 135TPI(MF2DD) & 80 or 60/90 LOCKING DISK BOX	39.95
50 DS/DD 135TPI(MF2DD) & 80 or 60/90 LOCKING DISK BOX	65.00

135TPI UNBRANDED	**10**	**25**	**50**	**100**	**500**	**10 in a case**
SS/DD (MF1DD)	11.95	29.00	57.00	98.00	?	12.95
DS/DD (MF2DD)	13.95	33.00	62.00	110.00	?	14.95

CUMANA DRIVES

ATARI ST 1 MEGABYTE	139.00
AMIGA 1 MEGABYTE	129.00

NO ADDITIONAL LEADS OR POWER SUPPLY REQUIRED

LOCKING DISK BOXES

5 1/4" HOLDS 50 -	7.95
3 1/2" HOLDS 40 -	7.95
5 1/4" HOLDS 100 -	9.95
60/90 (HOLDS 60 3" or 90 3 1/2")	9.95

Just write for more information. Cheques etc. payable **STORT SOFT.** (International orders remit in pounds Sterling by bank draft of Intl. money order and send amount quoted which will be exclusive of V.A.T. but include additional postage. Write for quote in any other currency).
ACCESS/MASTERCARD/EUROCARD/VISA accepted
CREDIT CARD ORDER LINE - 0279 89509 24 HOURS A DAY, 7 DAYS A WEEK V.A.T. & P&P INC. NO HIDDEN EXTRAS
WHAT YOU SEE IS WHAT YOU PAY
18 CROWN CLOSE, SHEERING, BISHOP'S STORTFORD, HERTS. CM22 7NX

ALL OUR PRICES INCLUDE CARRIAGE & VAT

HSV COMPUTER SERVICES LIMITED (YC)

23, Hampstead House, Town Centre, Basingstoke, RG21 1LG.

NEW LOWER PRICES

DISKETTES	QUANTITY	10	20	30	40	50	100
3½ SS/DD	135TPI	9.95	18.95	27.95	36.95	45.95	89.95
DS/DD	135TPI	10.95	20.95	30.95	40.95	50.95	99.95
5¼ SS/DD	48TPI	5.95	8.95	12.75	16.00	18.75	36.95
DS/DD	48TPI	6.95	9.95	13.95	16.95	19.95	37.95
DS/QD	96TPI	7.95	10.95	14.95	17.95	21.95	39.95
★COL DS/QD	96TPI	8.95	14.95	21.95	28.95	35.95	63.95
★★UNIVERSAL	96TPI	8.95	14.95	21.95	28.95	35.95	63.95

NEW LOWER PRICES

★ **COLOURS AVAILABLE:** Red, Blue, Green, Yellow, White, either in boxes of ten or mixed, two of each. Please state when ordering.
★★ **Universal disks are suitable for 40/80 track drives and have 2 notches and 2 holes.**
All 5¼ disks supplied in cardboard boxes with write protect tabs labels and envelopes and come with our no quibble money back or replacement guarantee.

DISKETTE STORAGE BOXES

10×5¼" Library Case	1.25
50×5¼" Hinged Lid	6.50
50×5¼" Hinged Lid Lockable	7.50
100×5¼" Hinged Lid Lockable	10.50
120×5¼" Hinged Lid Lockable	12.50
10×3½" Library Case	1.25
40×3½" Hinged Lid Lockable	7.95
80×3½" Hinged Lid Lockable	10.95

ACCESSORIES

80 Col Printer Stand - Nylon Coated Wire	**£12.95**
Tilt 'n' Turn Monitor Stands 12" Monitor	**£12.95**
" " " " " 14" Monitor	**£14.95**
Mouse Mat	**£6.95**
Minivac - Battery operated Cleaner	**£8.95**
Disk Cleaning Kit 5¼"	**£5.95**
Disk Cleaning 3½"	**£7.95**

NO EXTRAS TO PAY

Access

Credit Card Hotline (0256) 463507 Faxline (0256) 841018

BARCLAYCARD VISA

Ackroyd's Saga

Let your computer take the strain of learning tables.

By Allen & Margaret Webb

In case any regular readers of my Teacher's Pet column haven't worked it out for themselves, I've got a pretty shocking confession to make. I am very old fashioned, both in the way I bring up my children and in their education. I believe in old fashioned virtues of politeness, honesty and respect for one's elders and those old hat school subjects of spelling and learning tables. Both of these have been out of favour; the former because it was believed that it stifled creativity, the latter in some cases simply because the diversity of the curriculum pushed these subjects to the bottom of the pile. Luckily the primary school that both of my children attended believed that learning tables was important and table tests were a regular occurence.

A look around the shops will confirm the need for mental arithmetic and multiplication tables. How many times have you watched as simple calculations have been worked out on scraps of paper or the ubiquitous calculator when they could have been computed just as quickly in the brain?

Improving Numeric Skills

Ackroyd's Saga is the first of two games aimed at helping the learning process of mental arithmetic skills. In the game, the 0 to 12 times tables are tested. The nought times table is included since it is a difficult concept to grasp. In the game, you play the role of a trainee knight searching for the parts of the key which will let you into Ackroyd's castle. (Ackroyd is the usual evil king.) On your way to the castle you will encounter various nasties. You must fight these if you want to get passed them, and 'fighting' involves answering tables questions. You answer an odd number of questions. If you get more correct than wrong, you win.

There are five levels in the game with each level posing questions on different tables. The easiest level deals with 0 to 3 times tables, the most difficult deals with 0 to 12. In addition, the levels give you different times to respond. The default values give ten seconds at the easiest level and six seconds at the top level. You can change the times and number of sums if you wish by choosing the edit option in the game loader.

The game is controlled by a joystick (in port 2) or keyboard (S: moves south, E: east, N: North, W: West). To answer questions you simply type in the answer and press Return. Delete will clear any mistakes.

LOADER	SAVE name	Start Address	Finish address
1	SPRITES	12288	14784
2	CHARSET	10240	12287
3	HOUR-GLASS	8192	8920
4	OBJECT.1	6144	7573

The game comprises six modules. To convert the loaders to useable code, use the following procedure:
Type in POKE 44,64: POKE 64*256,0:NEW
LOAD and RUN the loader
LOAD and RUN the Code Saver routine using the details given in the table. You don't have to use the suggested names but if you don't, you must amend the BASIC portion accordingly.

Once you have completed this procedure for each loader, you can test them by LOADING them all (don't forget the secondary address... LOAD "name",8,1 or LOAD "name", 1,1). And type in the line:
SYS 6144:SYS6153

You should get the display and be set a question to answer. If this happens, all is well.

The BASIC program controls the whole program. You should note that the first portion assumes that you are loading from disk. Cassette users must change the device number.

The game play is quite simple. The knight walks in the direction you specify. If you use keyboard control, auto repeat allows you to hold the keys down. When you reach the edge of the window, the next part of the map is displayed. If you enter a square with a nasty, you must fight. If you win, the nasty vanishes. If you loose, you are dumped on the last square you were on. If you enter a square with a part of the key, it is automatically yours. Find all four keys and reach the castle door and the game ends.

Now we will complete the loaders and show you how to run the game. The last two loaders are converted to code as before but with a slight difference:

Type in POKE 56,128: CLR
LOAD and RUN the loader
LOAD and RUN the Code Saver routine using the details given in the table.

To play the game, reset the computer by turning it off and and on or by using SYS 64738. You then just LOAD and RUN the BASIC portion.

Next time we will give a map of the game and an editor which will allow you to change the locations of the key parts and the nasties.

LOADER	SAVE name	Start Address	Finish address
5	OBJECT.2	32768	36176
6	MAP	36864	40545

See listings on page 77.

CRAZY CHRISTMAS BARGAINS

NEOS MOUSE + SOFTWARE
★ (THE COMMODORE MOUSE) ★

NEOS MOUSE WITH "CHEESE" CASSETTE INC. "GENUINE CHEESE" ON DISK = £29.90
Wigmore disc version includes genuine save and load to disc.

"GENUINE CHEESE" on disc - £8.00
(including save and load of pictures with fast and slow load.)
Soon available Geos Compatible Mouse - Watch press for details.

ARTIST 64
(For use with Mouse or Joystick)

This is the most sophisticated, powerful and advanced art or graphics package available on a CBM 64 or 128.

"Artist 64 is an excellent graphics package and we were extremely impressed with its range of capabilities. It is in fact probably the most versatile graphics program that we have seen".

Your Commodore takes over where cheese leaves off. Although friendly and fun - can be used professionally with over 250,000 combinations of commands.

★GIVE YOUR 64/128 - AMIGA TYPE GRAPHICS★
Full colour working. Full screen working. Zoom and Pan. Create any brush fill, pattern or icon. Variable Text. Commodore and Epson printdumps. Add other print routines. Innovative colour commands."Over and Under" - (colours weave over and under each other) "Colour Cycling" "Duplicate objects without certain colours."
P.C.W. "Artist 64 is a compulsory purchase" **Tape or Disc = £27.50**

WIGMORE HOUSE LIMITED
ACCESS CHEQUES P.O. CASH ORDERS P & P = UK £1.50 Overseas £3.00
Dealer, Export and Educational Enquiries Welcome
113 Godwin Road Forest Gate E7 02W 01-555-3751

YORK ELECTRONIC RESEARCH
Commodore 64/Plus 4 Products

6502 ASSEMBLER 64/Plus 4* ..... tape/disk* £12.99
A sophisticated two-pass symbolic assembler and text editor which supports tape and disk filing. The assembler, the editor, and your source and object code may all be resident in memory simultaneously, facilitating rapid and interactive code development. Recently extended manual with many examples.

Z80 EMULATOR/CROSS-ASSEMBLER 64 only ..... disk £12.99
A unique integrated Z80 development package. The emulator compiles Z80 source code into optimised 6502 which runs on the 64 at approximately one sixth the speed of a 2MHz Z80. It supports all but 20 of the 688 Z80 operations, calls to 6502 routines, and interrupts. The cross assembler generates hex or binary Z80 object files. The disk also contains a powerful editor and several example programs.

BI-DIRECTIONAL RS232 INTERFACE WITH COMMUNICATIONS SOFTWARE 64 +4* .. tape/disk* £29.99
The 64 KERNAL supports RS232 via the user port. This interface provides the necessary voltage conversion for direct connection to RS232 printers, modems and other devices. It is compatible with Easyscript and Superscript. The unit is supplied with 1 metre of cable (add 75p per extra metre*) terminated in a 25-way male (or female*) D-connector. The software includes a terminal emulator which supports split baud rates and auto-dial, file transfer utilities, a menu driven port initialisation program, and a transparent printer driver which vectors the KERNAL to redirect device 4 printer output to the RS232 port.

*Please specify.

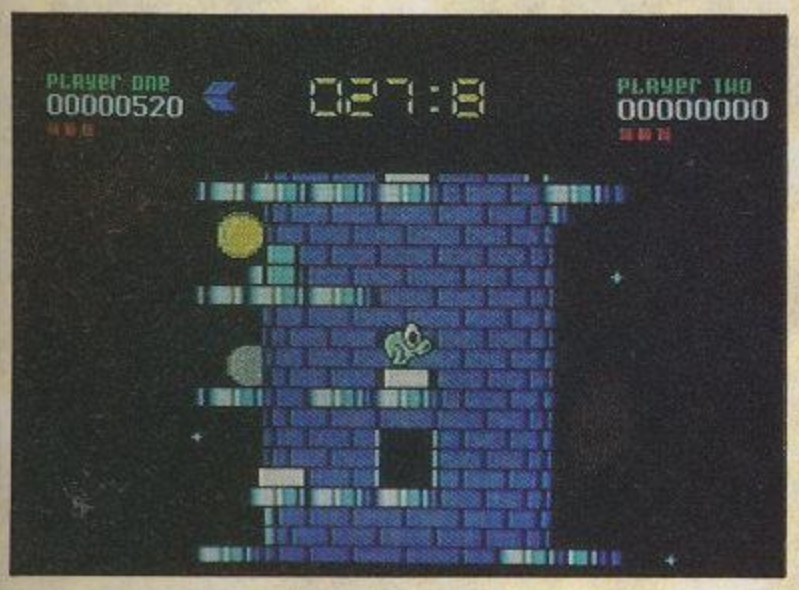
Prices are fully inclusive. Overseas orders add £2.50
Allow up to 1 week for delivery
Manuals available separately £1.00

YORK ELECTRONIC RESEARCH
The Fishergate Centre, Dept YC, 4 Fishergate, York YO1 4AB
Telephone: (0904) 610722

Games Reviews

For the latest on the shoot 'em up front, consult our review pages.

Que-dex



Inspired by Gremlin's Bounder, Que-dex is an arcade game in which you must look before you leap if you're going to get to the top of the high score table.

Que-dex consists of ten tracks of planes that can be attempted in any order but only the very brave or stupid dive straight into plane ten.

In plane one you simply have to complete a series of exercises that will prepare you for what's to come. In the other planes you must reach the GOAL before the time runs out. To get to the goal you will have to negotiate a maze, travel long lifts and through teleports, avoid ground that drains your time and areas that just disappear leaving you on the way to oblivion. You will have to get around locked doors that are opened only by finding specific keys. To add to your problems some keys remain invisible until you're next to them, and are usually next to a killer Skull and Cross bones, where one wrong move will cost you that game.

However, you can get some help from objects you can pick up such as amulets that reveal the GOAL and objects that give you extra speed or more time and sound surprise features that may help or hinder you.

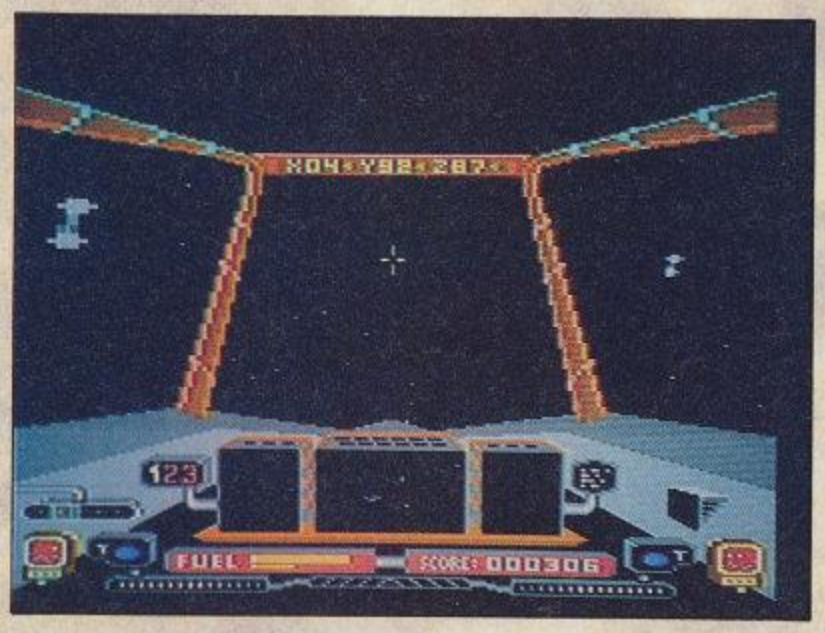
At the end of each plane you have a chance to pick up some extra points in a bonus screen and a chance to rest before attempting the next plane. This game would be tough enough without the time limit, with it, it's almost impossible.

T.H.

Touchline:

Title: *Que-dex.* ***Supplier:*** *Thalamus, 2 Minerva House, Calleva Park, Aldermaston, Berkshire RG7 4QW.* ***Machine:*** *C64.* ***Price:*** *£9.99 (C) £14.99 (Disk).*
Originality: *7/10.* ***Graphics:*** *7/10.* ***Playability:*** *âa28/10.* ***Value:*** *8/10.*

Starfox



In the unofficial sequel to Skyfox you are Hawkins and your mission is to destroy the aliens that have invaded the protective Rubicon cube that surrounds eight planets.

The standard Starfox is equipped with a turbodrive that will send you hurtling through space but will also drink fuel at an alarming rate and a standard laser. However, you can improve your chances and your craft by docking with motherships that orbit the eight planets and choosing from the selection of weapons that include energy bolts, shockers and more powerful lasers.

You'll need this extra weaponry to wipe out the invading convoys of aliens that come at you ten at a time. If you haven't got the right weapon you may have to shoot each alien four times to destroy it.

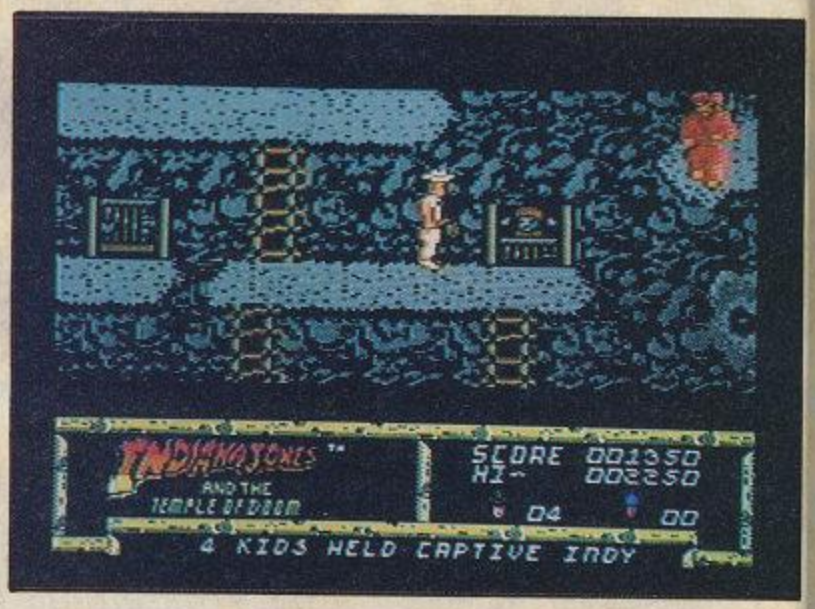
The aliens don't actually fire at you but they do exhaust your fuel supply which will cost you the game. You can refuel at a planet or from a refueling ship but only if you can find one in time.

Starfox is a game that will require its players to invest some time in it before they become hooked. Once they've completed a few levels (this will take some time) they will become hooked by it.

Touchline:

Title: *Starfox.* ***Supplier:*** *Reaktor, 9 Disraeli Rd, Putney, London sw15 2DR.* ***Tel:*** *01-785 4285.* ***Machine:*** *C64.* ***Price:*** *£9.99 (ca) £12.99 (Disk).*
Originality: *5/10.* ***Playability:*** *5/10.* ***Graphics:*** *5/10.* ***Value:*** *6/10.*

Indiana Jones and the Temple of Doom



Indiana Jones is set to burst onto the small screen in the C64 conversion of the Atari coin-up version of the film.

Armed with just his trusty whip Indy must fight off thuggee guards and snakes as he attempts a three stage game. In part one he must rescue children trapped in cages by whipping the locks off. These cages are spread throughout a cave network linked by ladders and ledges as well as posts that our hero can attach his whip to and swing across Tarzan style. If he manages to free all the children he can escape in a mine car and into part two.

This is the shortest part of the game and is simply a ride in a mine car down a broken track. When you come to a break in the track leaning over will avoid disaster, but may bring you into range of the Thuggee guards or into the path of the pursuing car. This is an all or nothing stage as taking a wrong turn will cost you a life but once you've learned the route it couldn't be easier.

At the end of the track you enter the Temple of Doom and can attempt to retrieve one of the Sankara stones. Once again you're attacked by thuggee guards and slithering snakes but if you get your timing right you can swing over the firey gourge, grab a stone and escape only to find yourself back in the caverns with more children to rescue.

As a conversion the game is reasonably close to the original (although the music is terrible). Unfortunately, the original game rapidly became repetitive, and desperately needed three or four more lvels. A good conversion but there have been better games to convert. **T.H.**

Touchline:

Title: *Indiana Jones and the Temple of Doom.* ***Supplier:*** *US Gold, 2/3 Holford Way, Birmingham. B6 7AX.* ***Tel:*** *021-356 3388.* ***Machine:*** *C64.* ***Price:*** *£9.99.*
Originality: *3/10.* ***Playability:*** *6/10.* ***Graphics:*** *5/10.* ***Value:*** *6/10.*

Captain America

When America is threathened with total annihilation who do you call. Superman? Ghostbusters? No! This time it's Captain America – the defender of the Constitution who must save the day!

Dr. Meglomann, a man who the CIA claimed they killed in Cuba in the early sixties has emerged from hiding and claimed the Presidency of the US of A, and if power isn't handed over he'll fire a rocket packed full of killer virus at North America and wipe everyone out.

One hundred elite marines stormed the mad doctors base but were all killed by the deadly virus. Now you, Captain America must save the world!

The doctor is holed up in the tube of Doom and it's not going to be easy to get him out. The tube of Doom consists of three concentric tubes packed with laser firing robots. Your mission is to fight your way through all three levels to destroy the rocket, and bring Dr. Meglomann to justice. As the game begins you are sitting at the controls of the Orbivator, an elevator that runs between the outer and middle cylinders. From this you can gain access to the rooms of the tube of Doom.

The deeper you get into the tube the greater the level of the virus that will slowly overcome even Captain America's superhuman strength and so you must stay within your immunity range. You must also find a way to increase your immunity so you can explore these deeper levels.

Perhaps the answers lie in the rooms that you can reach by battling the robots in each level. Here you'll find more laser firing and homing enemies as well as a source for your Captain America shields (your only weapon) and maybe even a few clues.

Captain America is a massive arcade adventure in which your reactions will have to match your brain power if you're going to survive long enough to save the day. T.H.

Touchline:

Title: *Captain America.* ***Supplier:*** *GO!, 2/3 Holford Way, Holford, Birmingham, B6 7AX.* ***Tel:*** *021-356 3388.* ***Machine:*** *C64.* ***Price:*** *£9.99*
Originality: *7/10.* ***Playability:*** *7/10.* ***Graphics:*** *6/10.* ***Value:*** *7/10.*

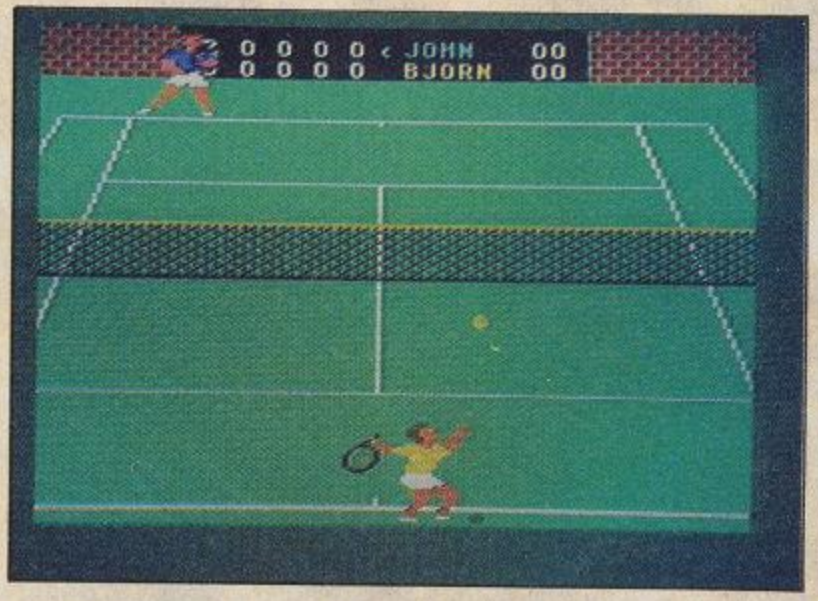
On Court Tennis

On Court Tennis is another of the Activision Gamestar games to be re-released by Firebird at a budget price. This time you can pick up your racket and stride out onto the centrecourt as Ivan, Bjorn, John or Jimmy to take on a computer or human opponent in a match lasting three or five sets.

As the players take their places on court the temptation is to write the game off as having poor graphics but gradually the addictiveness of the gameplay takes over. Even when you're 5-0 down you still think you've got a chance!

The game is controlled entirely by the joystick with it's movements deciding the strength and direction of the shot. This, of course, depends on how well you time your shots and whether you play the right shot at the right time. With that lot to think about it's lucky that the computer automatically moves you to the ball so you can concentrate on the shot.

The result is a tennis game that was over priced in the full-priced market, but at last as found it's right value for money. It's limited and at times not very pretty but as a cut priced tennis game it has the advantage. T.H.



Touchline:

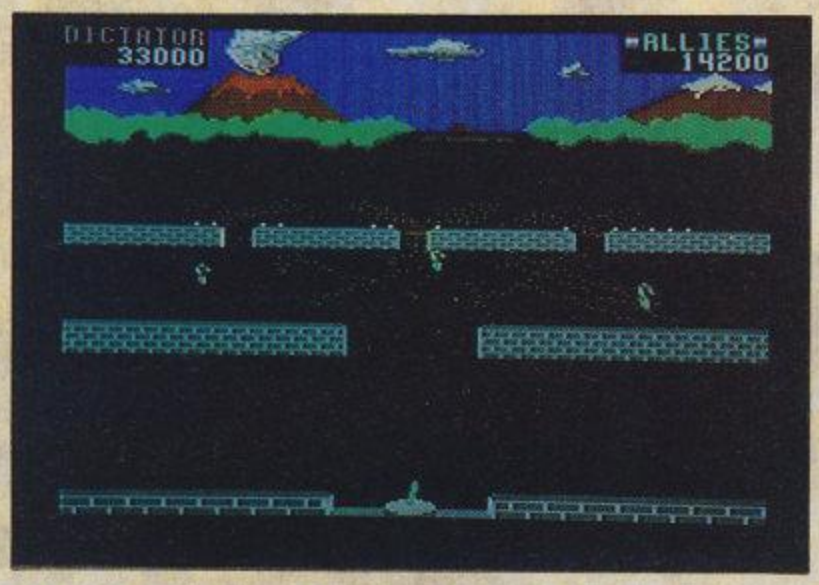
Title: *On Court Tennis.* ***Supplier:*** *Firebird, 64/76 New OOxford Street, London WC1A 1PS.* ***Tel:*** *01-379 6755.* ***Machine:*** *C64.* ***Price:*** *£1.99.*
Originality: *4/10.* ***Playability:*** *6/10.* ***Graphics:*** *4/10.* ***Value:*** *5/10.*

Beach Head II

Beach Head II, the game that shocked the world with it's realistic screams is back as part of Mastertronic's Americana range. In this, the sequel to the highly succesful Beach Head the evil, warmongering, bloodthirsty, power crazed maniac dictator known as the dragon is out for revenge and plans to destroy the forces that wrecked his fortress in the original game, that means you.

As in Beach Head, Beach Head II is a multi-stage arcade game, only this time you can play either side in a head to head contest.

The first sequence is a two part game with the dictator making a massive gun that tries to blast the good guys as they're dropped by helicopter behind the first line of defences. Once they've all been dropped you must bring



them forward while running the gauntlet of the giant gun. If they're hit, they let out a bloodcurdling scream or yell for a medic! As you approach the gun you can send one man over a wall while the gun will be destroyed but soon replaced so you have to move quickly.

In stage two you must rescue the men captured by the dictator by turning their own gun against them. This isn't going to be easy as the prisoners escaping across the court yard can be shot by men on walls, blown up by mines thrown out from trap doors, killed by a track or slowly and loudly crushed by a tank.

Part three is a Zaxxon style screen in which you must fly the escaped prisoners to safety in three helicopters, along as you can get past the Dragon's defences and finally in part four, your in man to man combat with the dictator in his underground caves. To win you must hurl pointed sticks at the villain and escape his deadly throws.

Beach Head II is a loud, action-all-the-way arcade games that won't win any good taste awards. **T.H.**

Touchline:

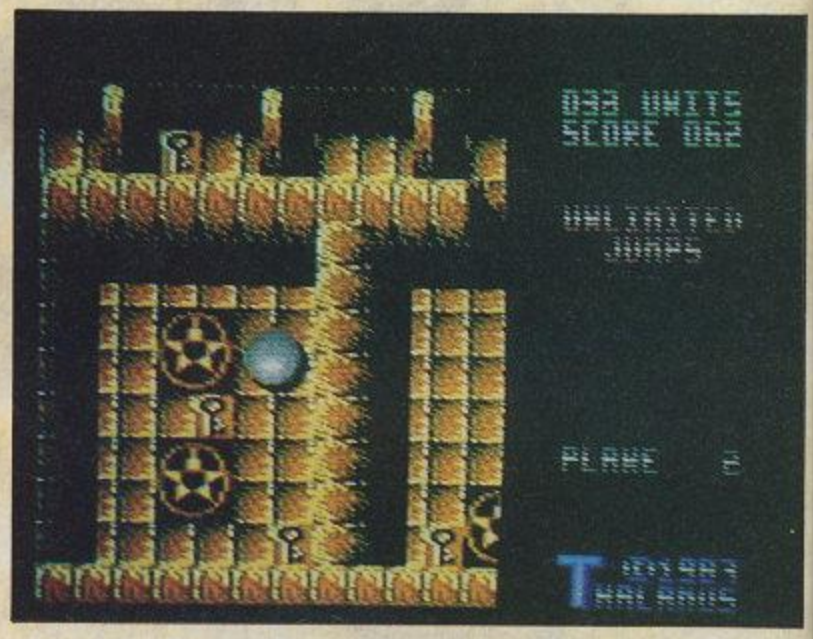
Title: *Beach Head II.* ***Supplier:*** *Americana, 8-10 Paul Street, London EC2.* ***Tel:*** *01-377 6880.* ***Machine:*** *C64.* ***Price:*** *£2.99.* ***Originality:*** *4/10.* ***Playability:*** *7/10.* ***Graphics:*** *4/10.* ***Value:*** *7/10.*

Nebulus

Nebulus is yet another incredibly addictive Hewson arcade game in which you, a cute little frog like critter, must destroy a series of unauthorised towers that someone has built in the sea. Your job is to climb up to the top of these towers and destroy them.

Unfortunately, this is going to be far from easy. You arrive by mini-sub at the base of the first of eight towers. Around it you can see a series of platforms and lifts that you must navigate as well as tunnels that lead from one side of the tower to the other. Each tower is also patrolled by a selection of nasties. Some can be blasted with your bubble gun, while others are indestructable and must be avoided at all costs. This isn't always easy when you're walking along platforms that disappear from under your feet, slide you backwards as quickly as you can run forward and gaps that are just further than you can jump.

It all adds up to a great game that adds new lease of life to the addictive platform game format. **T.H.**



Touchline:

Title: *Nebulus.* ***Supplier:*** *Hewson Consultants, Hewson House, 56B Milton Trading Estate, Milton, Abingdon, Oxon.* ***Tel:*** *0235 832939.* ***Machine:*** *C64.* ***Price:*** *£8.95.* ***Originality:*** *8/10.* ***Playability:*** *7/10.* ***Graphics:*** *7/10.* ***Value:*** *7/10.*

Action Force

When the evil enemy Cobra attacked the small island of Botsneda, the military installations were destroyed. All except the eastern part which contains some classified information stored on hard disk. This data must not fall into enemy hands. There just isn't time to organise a conventional force attack so they must send in the Action Force.

Lady Jay and Crankcase man the A.W.E. Sriker that has been quickly modified for data retrieval and so must be protected by you, Wild Bill, and Flint in the Dragonfly XH-1 helicopter.

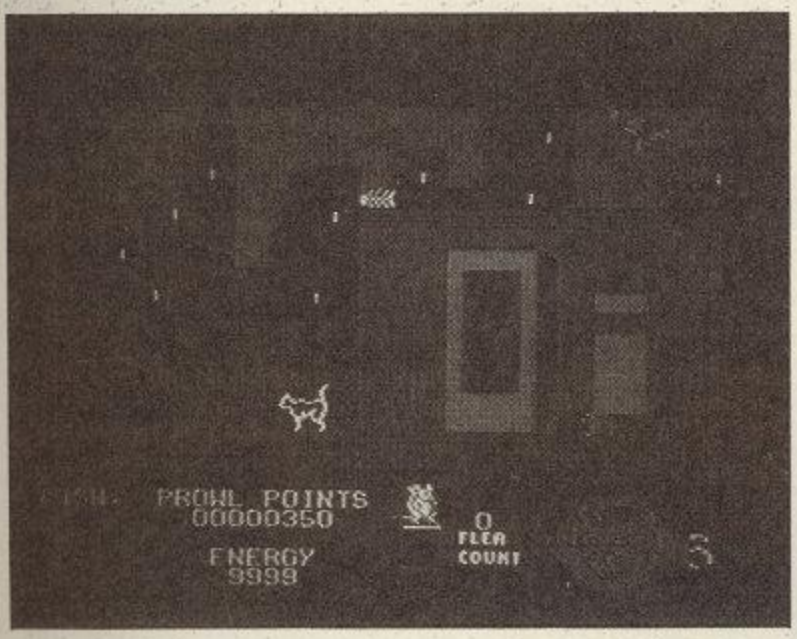
The enemy will bombard you with other helicopters, planes, guns and missiles that you must blast and avoid while clearing a path for Striker.

The result is a standard sideways scrolling shoot 'em-up with eight levels that may have some appeal for Action Force fans. Anyone else who wants helicopter action should take Gunship for a test flight. **T.H.**

Touchline:

Title: *Action Force.* ***Supplier:*** *Virgin Games, 2-4 Vernon Yard, Portobello Rd., London W11 2DX.* ***Tel:*** *01-727 8070.* ***Machine:*** *C64.* ***Price:*** *£9.95* – disk only.
Originality: *4/10.* ***Playability:*** *6/10.* ***Graphics:*** *5/10.* ***Value:*** *6/10.*

On the Tiles



*F*irebird and Odin present the first feline simulation in which you must prowl the streets in search of fish bones to gain control of eight streets.

Unfortuantely, all is not purrfect for our furry hero who must avoid the attentions of blood sucking fleas and the draining effect of frogs as well as the fatal touch of kitty hawks and hedghogs. Luckily, you can regain lost energy for grabbing a sparrow or mouse as you leap from window sill to rooftop.

You can protect yourself from things that cost one of your nine lives by spitting some green unnamed substance at them. However, at times you don't have time to react since you must press the space bar to fire which is never near enough to the joystick to save myself.

On the tiles is a good but tough game which features some nice animation and addictive gameplay. **T.H.**

Touchline:

Title: *On The Tiles.* ***Supplier:*** *Firebird/Odin, 64/76 New Oxford St., London WC1A 1PS.* ***Tel:*** *01-379 6755.* ***Machine:*** *C64.* ***Price:*** *£7.95 (C) £12.95 (Disk).*
Originality: *9/10.* ***Playability:*** *6/10.* ***Graphics:*** *7/10.* ***Value:*** *8/10.*

Super Sprint

*S*uper Sprint is the latest coin-up conversion for the C64 and attempts to recreate the arcade racing game that's been an amazing arcade hit.

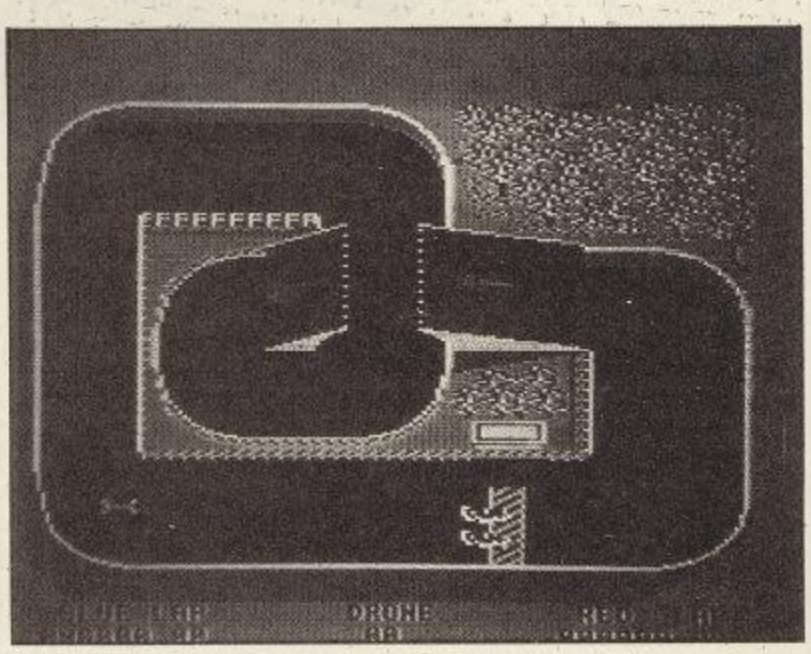
Unfortunately, it's impossible to get three players around a C64 and so this conversion has only a one or two player option with the remaining cars driven by drones. These drones never skid or crash but are easily beaten by a skillful player, but will wipe you out if you hurtle around every bend and end up in a smouldering heap. Your car is quickly replaced by one that arrives be helicopter but you will have lost valuable time.

Once you've selected one or two players (and if two either a head to head conflict or a normal super sprint) you can select one of the four tracks that feature tight bends, bridges that obscure your view and gates that open and close to allow you to take short cuts that could win you the race.

On the track you may also find oil slicks that will send you spinning, bonus points and accasionally gold spanners. If you collect three of these spanners in a race you can improve your car by adding super traction, turbo acceleration or a higher top speed or just improve your score with a score multiplier.

Whatever you choose even the experienced champions have to avoid the spinning whirlwind that gets you in a spin if you're caught in it's path.

Super Sprint is a good conversion that will drive racing fans round the bend as they attempt to build a car that can beat all comers. **T.H.**



Touchline:

Title: *Super Sprint.* ***Supplier:*** *Electric Dreams, Terminus House, Terminus Terrace, Southampton, Hampshire SO1 1FE.* ***Tel:*** *0703 229694.* ***Machine:*** *C64.* ***Price:*** *£9.95 (C)*
Originality: *4/10.* ***Playability:*** *8/10.* ***Graphics:*** *6/10.* ***Value:*** *7/10.* YC

AMAZING NEW 'TOTAL BACKUP' CARTRIDGE FOR COMMODORE 64 AND 128 (IN 64 MODE)

NEW ACTION REPLAY V.3 FROM DOSOFT
UNSTOPPABLE 'TOTAL BACKUP' CARTRIDGE

OUR NEW INNOVATIVE HARDWARE AND SOFTWARE COMBINATION GIVES YOU MORE POWER, MORE FEATURES, MORE FUN!!

Action Replay V.3 is now more powerful, has more features and will back up more programs than any competing cartridge! It handles the latest protected games!

Just plug it into the expansion port then press the Magic Button! Our new hardware design makes this absolutely unstoppable. Now you are in complete control. Tape to tape. Tape to disk. Disk to disk. Disk to tape. No special knowledge is required. It tells you exactly what to do. It's so friendly—and it's a lot of fun too!

Become invulnerable! Action Replay V.3 now has a SPRITE KILLER. Play weird games! The unique SPRITE MONITOR lets you save sprites from one game and load them in another! The mind boggles!

Nothing else offers all these features at this price!

■ Mega-Freeze
Freeze and save ANY working program—the Magic Button is unstoppable—unlike other cartridges. Also it is now undetectable by software!

■ Independent
All programs reload without cartridge—and at turbo speed—tape or disk.

■ Extra Fast
Make all backups at Turbo Speed—much faster than rival cartridges. Dual speed Tape Turbo is up to 3 times faster than commercial Turbos 10 times faster than Commodore.

■ Super Compact
Intelligent compacting techniques minimise program size into single files. Save 3 or more per disk side.

■ MultistageSaves
Transfers MORE multistage loaders from tape to disk than any other. And all parts Turbo load—another feature unique to Action Replay.

■ So Easy to Use
Action Replay V.3 is a delight to use. All functions described on screen. No user knowledge is required.

■ SpriteControl
Unique Sprite Monitor lets you disable them. Save them! Change them!! Customise your games!!!

■ Picture Save
Unique! Save ANY Multicolour Picture, including title screens. Compatible with Blazing Paddles, Koala, Graphic Slideshow etc. Built-in Slideshow for tape users.

■ Disk Fastloader
Superb bonus feature loads five times faster. Takes up NO memory.

■ Code Inspector
Look at whole memory—program, registers, etc. Everything you need.

■ Compatible
Fully compatible with Commodore 64, 64C, 128 and 128D in 64 mode, 1541, 1541C, 1570, 1571 and Enhancer Drives, CBM compatible tape recorders, FastDOS, and Turbo ROM—can the others say that???

£29.99 GET MORE FOR LESS!

Buy Action Replay with DiskMate in ONE cartridge ONLY £39.99

Action Replay and DiskMate are also available from Datel Electronics

DiskMate Cartridge V.2
This is the way Commodore should have their DOS. Single keystroke commands: e.g. LOAD and RUN straight from directory, and much, much more! Works with all drives: 1541, 1570 and 1571.

- 2 minute complete Backup
- Very fast disk functions
- Invisible
- Toolkit
- 10 second Format
- Powerful 'Floating' Monitor
- SAVE "@0:" bug cured
- Takes up NO memory
- Unstoppable reset

£14.99 TERRIFIC VALUE

Buy DiskMate with Action Replay in ONE cartridge ONLY £39.99

100% SUCCESS? WE ASK: WHO'S KIDDING WHO?
Action Replay V.3 will back-up ANY program which ANY other cartridge can—and much more! It also has unmatchable features. For instance, 'Freeze Frame' uses more disk space, saves SLOWER, has a SLOWER tape loader and has NO built-in disk fastloader, NO picture, NO Sprite, NO restart-features, yet costs £10 more!!! So, come on, who's kidding who? If Action Replay V.3 doesn't live up to our claims, return it within 7 days of receipt and you can have your money back!

Graphics Slideshow
View pix from games, graphic packages or loading screens singly or in sequence. 16 pictures per disk. Turboload. Disk only.

LOOKING GOOD AT £4.95
SPECIAL OFFER!
Enhancement and Slideshow on one disk ONLY £11.95

Enhancement Disk
Get even more from Action Replay with this Bonus Disk to back up the new non-standard multi-stage loaders.

GREAT VALUE AT £7.95

Our cartridges carry a twelve month guarantee against mechanical failure.

How to get your DoSoftware
Please send cash/cheque/P.O. with order for fast despatch (SAE only for full details). Send off now to:

DoSoft (Dept YC), 2 Oakmoor Ave, Blackpool, FY2 0EE

UK Postage included. Europe add £0.75, or £2 if order includes Blank Disks. Overseas add £1.50 for Airmail, or £3.50 if order includes Blank Disks.

SUPER SOFTWARE SALE
Buy NOW and SAVE! SAVE! SAVE!

The DoSoft Collection
UNBEATABLE OFFER The latest versions of MegaTransfer, MegaUtility, MegaTape and ProSprite ALL on One Disk
HALF PRICE £12.50 WOW!

DoSoft Super Disk Kit
AS ABOVE but with 12 Xidex Precision Boxed Disks. A great start to get your programs on disk at a giveaway price!
SAVE! SAVE! SAVE! £19.99

Mega MegaTape Savings
OUR FAMOUS Tape-to-Tape utility for one Datassette at an unbeatable price.
BUY NOW £5 BRILLIANT!

Xidex Precision Disks
From the WORLD'S LEADING SUPPLIER—12 Double Sided, Double Density 5¼ Disks complete with sleeves, labels, tabs and FREE high impact plastic storage box
TWELVE FOR ONLY £8.50!

DoSoft

You'll Do it Better with DoSoft

DISK TO DISK • DISK TO TAPE • TAPE TO TAPE • TAPE TO DISK • HARDWARE TRANSFERS MULTI-PARTS • DUMPS HI-RES SCREENS

FAST DISK UTILITIES • LOADERS • 2-MIN DISK COPY • FAST DISK FILE COPY • FAST FORMAT

THE MPS803
PRINTKIT IV

AT LAST
Top quality performance from your MPS803 Printer. Simply fit 'PRINTKIT IV' directly to your MPS803 printer and you will get:

*TRUE DESCENDERS *A BOLD OPTION
*UNDERLINING *ITALICS

And up to 50% speed increase!

All facilities are fully CBM compatible "'PRINTKIT IV' is a very impressive upgrade kit" CCI Nov '87.
"Will give your MPS803 a new lease of life" YC Dec '87.
Send just £30.00 to join the hundreds of satisfied customers.

NEW! Coming soon... Connect your MPS803 DIRECTLY to your Amiga, ST, PC,... Full information when you order 'PRINTKIT IV'.

We also supply: Ribbons, Tractor feeds, Serial leads etc. Call for details.

AVON PRINTER TECHNOLOGY

SWINDON HOUSE; 4 HOWARD ROAD; SOUTHVILLE; BRISTOL BS3 1QH. Telephone BRISTOL (0272) 667167
(enquiries from non-UK Distributors welcome)* add £2.00 P&P for overseas orders
7 days delivery. Full guarantee.

OFFICIAL COMMODORE/AMIGA DEALER

COMPUTERS	
Amiga 2000 + NEW 1084 Colour Mon	1378.85
Amiga 500 + dPaint + MORE!	459.00
Amiga 500 + Philips 8833 Stereo Colour Mon	715.00
Commodore 128/C2N/3 Tapes/Joystick/Games	219.00
Commodore 64C/C2N/3 Tapes/Joystick/Sports Bag/Games	159.00
PRINTERS	
OKIMATE 20 TEXT & FULL GRAPHICS MULTI-COLOUR FOR AMIGA	199.00
Star NL10 for C64/128 120cps & NLQ	219.00
Citizen 120D Dot Matrix 120cps & NLQ	179.00
MONITORS	
Philips 8833 Col Mon inc lead	279.00
Philips BM7502 Green mon inc lead	82.00
Philips BM7522 Amber Mon inc lead	94.00
MISCELLANEOUS	
Commodore 1541C Disk Drive	159.00
Commodore 1571 Disk Drive	189.00
Commodore C2N data Recorder	35.00
Super-G Cent Inerf + Graphics	34.95
RS232 Interface with disk software	57.44
Commodore 64 Power Supply	26.45
Amiga Modulator	24.99
Amiga 500 512K RAM Expansion + Clock	99.95
Amiga 2000 2Mb Ram Card ...§	i378.35
Cumana CAX354 Amiga Disk Drive	135.00
Surge Protector 13 Amp Plug (Adapter £14.95)	11.95
Amiga DOS Ref Manual (2nd Ed) (p&p £2)	22.95
C128 Official Prog's Ref Guide (p&p £2)	18.95
C64 Official Prog's Ref Guide (p&p £2)	7.95
SOFTWARE (Examples)	
Amiga Scribble 2	79.00
Amiga Superbase	86.95
Amiga Pro Midi Studio	139.00
Amiga Aegis Sonix	45.00
Amiga Deluxe Paint 2	69.95
Amiga DigiView inc A500/2000 Adaptor	191.00
Superbase 128 Programmable Database	45.95
Superscript 128 Word Processor	45.95
Tasword 64 40/80 Col WP - Tape/Disk	17.95/19.95
VizaWrite Classic 128 WP + Spell Check	79.35

ALL PRICES INC. VAT. CARRIAGE £8, EXPRESS DELIVERY £12
Software & Small Items FREE

Delta Pi Software Ltd

8 Ruswarp Lane, WHITBY, N. Yorks. YO2 1ND.
Tel: 0947 600065 (9am-7pm)

Teacher's Pet

Need some help with your studies? Then take a look at the latest educational packages. Learning can be fun!

By Margaret Webb

Following the dearth of new educational software over the last year or so, it's nice to have enough material to write another Teacher's Pet column. I want to discuss three packages which are all very different in subject matter. While the review copies all came on disks, there are no technical reasons to preclude their appearance on cassette. In fact, Biology, from Software Horizons, came with a cassette inlay.

'O'/GCSE Mathematics

The first package is written by Evelyn Mills, a name which should be familiar to regular readers of *Your Commodore*. This package covers some of the main areas of the 'O' level and GCSE syllabuses in mathematics. Extensive use of a graphics system called Video Basic 64 is used, which allows easy use of high resolution graphics, permitting the drawing of circles and lines and the use of fancy shadings and patterns which is used to enhance the appearance of the package and illustrate certain aspects.

The software covers six main topics which include:

Basic Mathematics.
Algebra.
Geometry.
Progressive Mathematics.
Trigonometry.
Linear programming and statistics.

A final section provides a selection of questions extracted from past 'O' level exam papers. In keeping with most exam based educational software, the material provided is more of a revision aid for use in conjunction with normal texts and tuition. To give you some idea of the content, I will run through two of the sections – geometry and algebra.

The use of high resolution graphics is put to best use in the geometry section. This section covers a number of topics which include circles, sectors, chords and tangents, plane shapes and polygons. The algebra section, on the other hand, requires less emphasis on graphics. The areas covered include law of indices, cross multiplication, removal of brackets, factorising quadratic equations and simultaneous equations.

The examination section is, as expected, faily testing and extends beyond the material given in the package. I think however, this is only to be expected.

All sections give a good mix of handy tips or rules of thumb and illustrative examples. There is, however, no error trapping, allowing ridiculous answers to crash the program. Some examples required input from the user – ensuring that he didn't fall asleep! Overall, the content is good and is presented in an interesting manner. Although it may sound carping, there was one irritating aspect.

All sections use Video Basic to generate fancy (and in my view) superfluous displays between topics. Some of these took some time to be drawn and became a little boring. My main objection is that these displays occupy valuable program space which could be used to better effect.

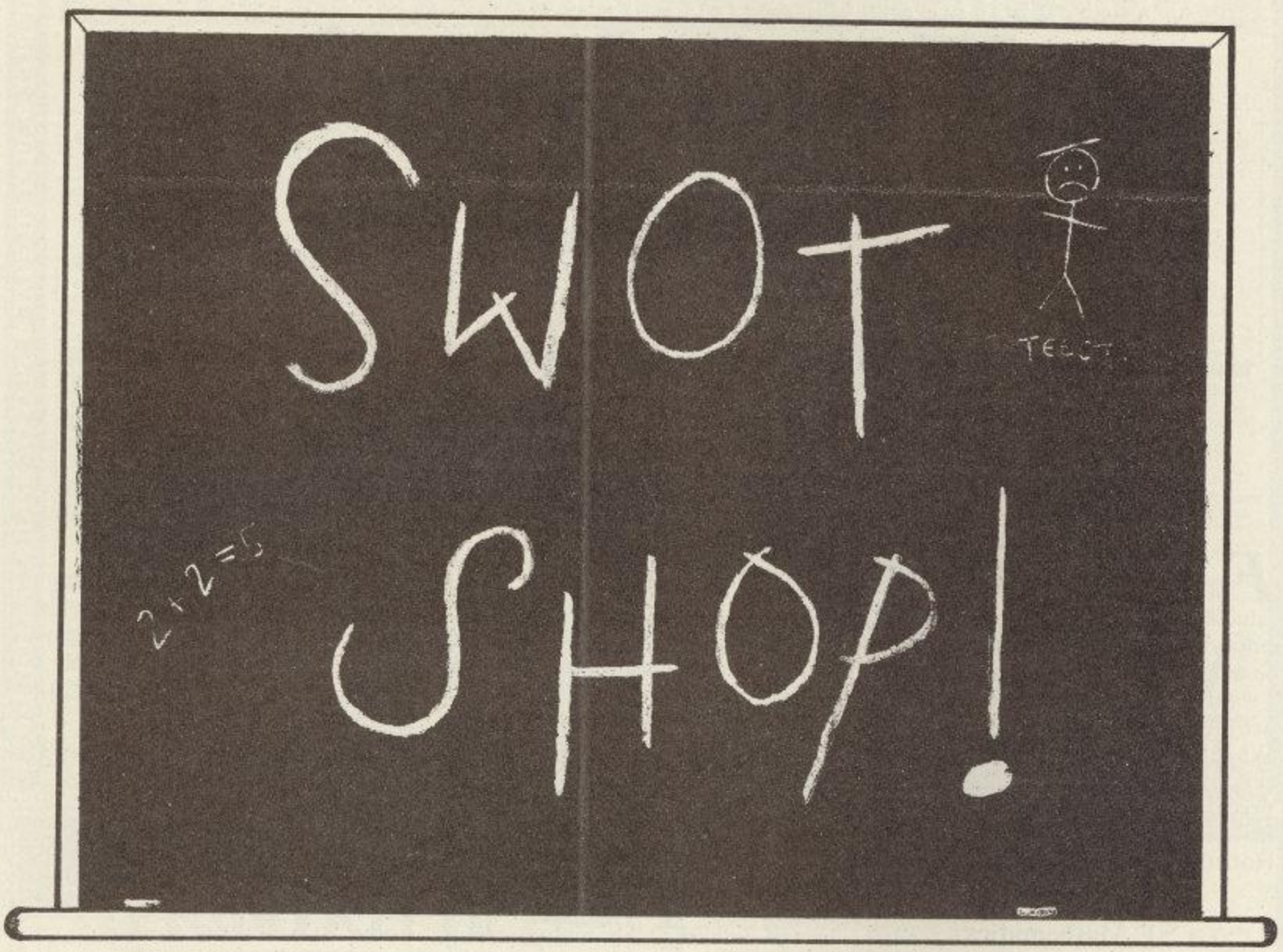
Notwithstanding this point, the disk is filled well with something like 130K of software on it. One final point is that the examination section expects you to work from the monitor. This won't present a problem for those using their own copy at home but is of little value in a busy classroom since it locks up a machine which could be otherwise used. A better idea would have been to provide an option to allow you to make a hard copy of the examination questions and so that the computer could be released for other users. It would be necessary to return to the machine for the answers.

History Package

The next offering comes courtesy of Duncan Bowen School, Ashford. This software uses the Quill adventure writer to create a novel approach to the teaching of History. History is usually a sure way to send pupils to sleep, as it is always full of dates, places and names and has as much life in it as a building brick.

The fact is that History is a living subject which involves people of all walks of life. By involving the pupil in the subject, it becomes live and interesting, and software uses the adventure concept to achieve this goal.

The disk contains two packages covering different aspects of the same problem. The main portion relates to an investigation of the past. The pupil has to "travel" around seeking information which will help solve a Victorian murder. To achieve this aim, you must examine a wide range of sources of information such as



records, diaries, memorials in churches and listen to the gossip.

In the first part you have to compile the basic facts from archival material. You have access to contempary material in the second part, and with this you attempt to form a case against the murderer. Two further parts provide further information and quiz your findings.

In the second package, the pupil has to explore a Kentish village and map it. The final aim is to compile as much information as possible about a family that lived there.

Overall, the main theme of the package is that there is alot of material available which is used to explore the past and shows where it is found and how it can be used. The software is detailed and well thought out – the documentation is copious and extremely useful; providing teacher's notes and help for the pupils. The material is ideal for project work, both for groups of children and the individual. I believe that this software is free provided that a blank disk or tape is sent.

Revision Series

Finally, I received some sample extracts from a series, written by Software Horizons, whose software is very much of the subject summary/revision genre. The system uses a kernel of routines which perform some fixed actions on a database. The database is specific to each subject. The format is text only with choices made from menus.

Each topic has a block of notes occupying two or three screen loads, which must be read in conjunction with normal notes. There are then a number of questions aimed at testing the pupil's knowledge. These are:
Single question: these simply require a typed answer to a question.
Multiple choice: three possible answers are given for the pupil to choose from.
True or false
Group questions: answers are chosen from a given selection to answer a group of questions.
Time test
Fill in paragraph: the pupil has to insert the missing keywords into a paragraph.

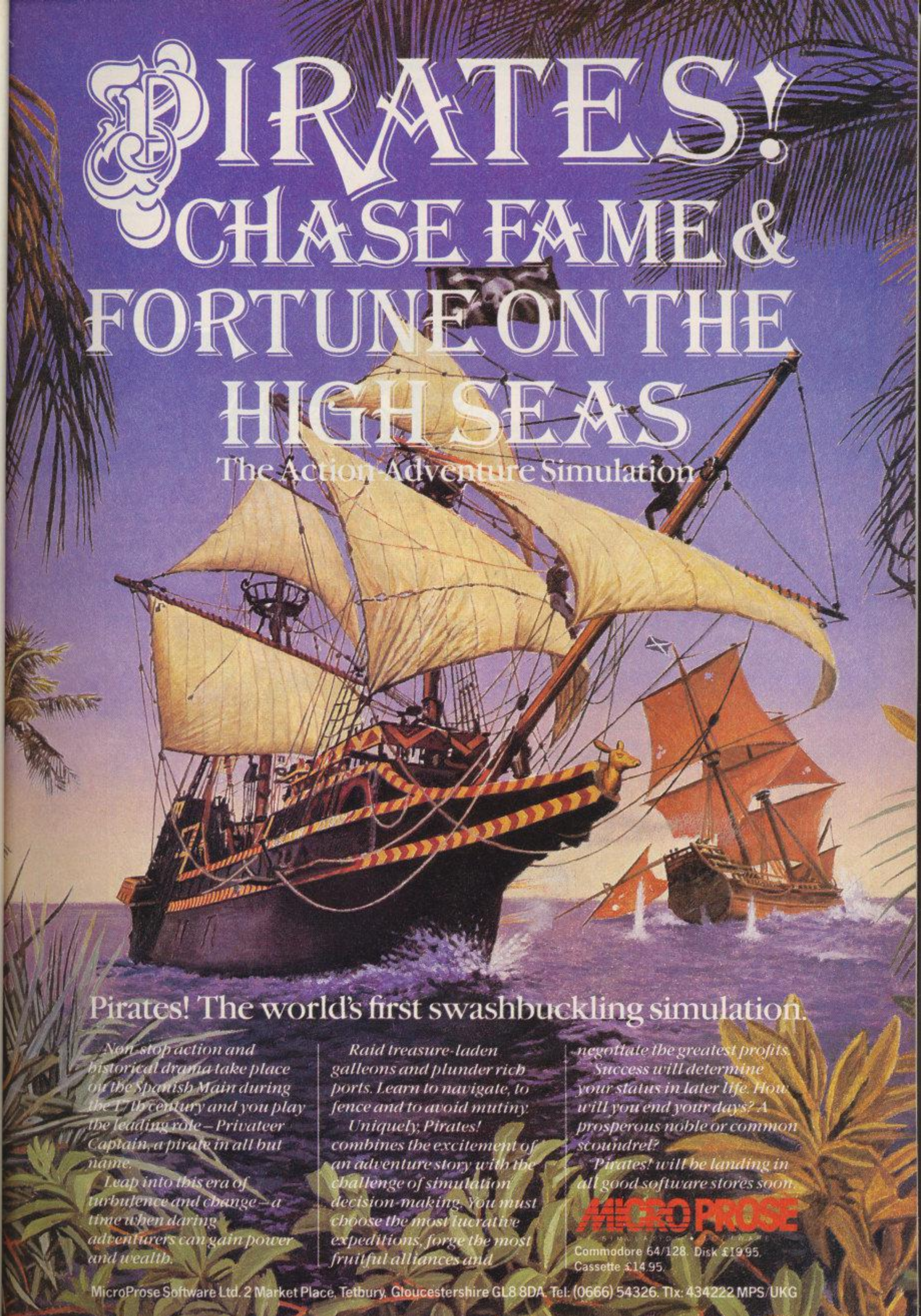
A nice touch is the program's ability to tolerate minor deviations in spelling. Overall this package does its job well, but due to the lack of graphics, is rather unexciting.

Touchline:
Title: *'O'/GCSE Mathematics.* ***Supplier:*** *Adamsoft, 18 Norwich Avenue, Rochdale, Lancs. OL11 5JZ.* ***Price:*** *£12.95.*

Title: *History Revision.* ***Supplier:*** *Mr J. Fanning, Duncan Bowen Youth Wing, Duncan Bowen School, Stanhope Road, Ashford, Kent.* ***price:*** *Free of charge.*

Title: *Revision Series.* ***Supplier:*** *Software Horizons, The Mall Centre, Main Street, Wicklow Town, Co. Wicklow, Eire.* ***Price:***

VG


PIRATES!
CHASE FAME & FORTUNE ON THE HIGH SEAS
The Action-Adventure Simulation
Pirates! The world's first swashbuckling simulation.
Non-stop action and historical drama take place on the Spanish Main during the 17th century and you play the leading role – Privateer Captain, a pirate in all but name.
Leap into this era of turbulence and change – a time when daring adventurers can gain power and wealth.
Raid treasure-laden galleons and plunder rich ports. Learn to navigate, to fence and to avoid mutiny.
Uniquely, Pirates! combines the excitement of an adventure story with the challenge of simulation decision-making. You must choose the most lucrative expeditions, forge the most fruitful alliances and negotiate the greatest profits.
Success will determine your status in later life. How will you end your days? A prosperous noble or common scoundrel?
Pirates! will be landing in all good software stores soon.
MICROPROSE
Commodore 64/128. Disk £19.95. Cassette £14.95.
MicroProse Software Ltd. 2 Market Place, Tetbury, Gloucestershire GL8 8DA. Tel: (0666) 54326. Tlx: 434222 MPS/UKG

Win a Konix Joystick

Konix is set to launch a new joystick onto the market. We're giving ten away as prizes in this month's competition.

The Konix joystick is probably the one of the best known joysticks available. Now Konix is set to take the market by storm once again with a new version of the joystick, now with an auto fire facility.

Your Commodore is pleased to team up with Konix for this month's competition. We are giving away ten auto-fire joysticks to the first ten correct entries pulled out of the hat after the closing date.

How to Enter

Study the two cartoons, there are a number of differences between them. Once you have decided how many differences there are complete the entry coupon and send it to the editorial address (see below). Please write the number of differences that you have found on the back of the envelope. If you don't then your entry will not be accepted.

The Rules

Entries will not be accepted from employees of Argus Specialist Publications and Konix. This restriction also applies to employees' families and agents of the companies.

The How to Enter section forms part of the rules. The Editor's decision is final and no correspondence will be entered into.

Konix Competition Entry Coupon

Name .....

Address .....

.....

Postcode .....

Number of differences found .....

Post to: *Your Commodore*, Konix Competition, 1 Golden Square, London W1R 3AB. Closing date: Friday 29th January 1988.

SERIOUS 128 SOFTWARE

1351 Mouse

The only 100% proportional compatible Commodore Mouse, works with GEOS 64/128, CADPAK and CHARTPAK. Only £29.95 GEOS 64 update to use 1351 Mouse....£7.50

The Big Blue Reader CP/M

New from S.O.G.W.A.P. Software Inc., The Big Blue Reader allows you to transfer files generated on most IBM-Compatible (MS-DOS) software to all three operation modes of the Commodore 128 and vice versa. Thus, files can be transferred to or from MS-DOS, 128 and CP/M disk formats, with optional ASCII translation.

You may no longer be discouraged because your C128 is not MS-DOS disk compatible, or that your C128 CP/M disks are not industry standard. The program, which runs in C128 mode, is available for £29.95 by mail order. Detailed information is available on request.

★New Little Blue Reader for 64 Users
★ MS-DOS disk backup. ★ CP/M Formatting Utility.
★ ASCII to Pet ASCII translation.

New 3 1/2" Disk Drives.

The **NEW** Commodore 1581 1 Megabyte disk drive is now available. The **NEW** 3 1/2" disk drive is compatible with most commercial software and will operate on the Commodore 128, 64C, Plus/4, C16 and VIC-20. The 1581 offers the professional user, 808k formatted disk capacity, (3160 Blocks Free), 8,000 Bytes per second transfer rate and sub-directories. Commercial software available includes HackPack, Petspeed, Oxford pascal, Fontmaster with Spellmaster, CADPAK and Chartpak. Write for more detailed information.

★★ Now Available for only £199.95 ★★

512K RamPack and RAMDOS	**£174.95**
GEOS 128	**£44.95**
BASIC 8	**£34.95**
CADPAK/CHARTPAK §.	**£34.95**
Petspeed/Oxford Pascal/Hackpack	**£18.95**
Mouse Mat	**£5.99**

Send Cheque/Postal Order or write for more information to:-

Financial Systems Software Ltd,

2nd Floor, Anbrian House, St. Marys Street, Worcester. WR1 1HA
Telephone: (0905) 611463

(Overseas orders please add £2.50. Please allow upto 14 days for delivery). All Prices Include VAT and Postage and Packaging.

★★★ EXPORT ENQUIRIES WELCOME ★★★

FYNANCIAL SYSTEMS

BYTES&PIECES

THE 128 CANNON

Here is the package for ALL 128 owners.

- ★ **NIBBLER**-works with single or between two 1541, 1570, 1571 drives.
- ★ **FILE COPIER**-easy file maintenance & manipulation
- ★ **FAST-COPIER**-use for your data disks
- ★ **1581 FAST COPIER**-for the new 3.5" high speed drive
- ★ **1581 FILE COPIER**-high speed file manipulation
- ★ **MFM COPIER**-for IBM and CP/M disks
- ★ **T/S EDITOR**-*works with 1541/1570/1571/1581 drives*
- ★ **ERROR SCANNER**-complete on screen display
- ★ **DENSITY SCANNER**-find altered densities track by track
- ★ **DIRECTORY EDITOR**-alter and organise the directory
- ★ **BONUS**-100 parameters
- ★ **COPY** your precious software onto 3.5" format

never before has so much power been available for the 128. Let us show you just how powerful. **Order today!**

£29.95

C128 HELPER

THE FIRST ELECTRONIC C128 REFERENCE MANUAL

The C128 HELPER is the first electronic reference manual for your C128. If you have ever found yourself in the middle of programming and needing information, this is the utility for you. Let's say you are programming in powerful BASIC 7.0 and you need help. Touch the 'Help' key and a menu appears instantly. Select the required help from the menu and you get a full screen of information and examples. Touch another key and its printed out. Then you are returned to your BASIC programme. The C128 HELPER works in 80 column mode and with the 1541/1570/1571 and 1581 drives and is co-resident with your BASIC programs and all BASIC 7.0 commands and functions and available with full explanations and examples. It also allows you to perform a screen dump from BASIC.
Perhaps the single most exciting point is that the program is user-definable. You can edit HELPER or create your own custom files. You are guided with prompts to construct your own screens and menus. You could make your own electronic pads or helpers for other programs. The list is endless.

Only £24.95

All our programs are available in 3.5" format (£1.00 extra) Foreign orders please add £2 to total cost of software. Otherwise prices include VAT and post. Send S.A.E. for list of ALL our 128 products-**THAT'S ALL WE SELL!**

A Powerful Wordprocessor

for the Commodore 128®

Font master 128

Selected for the 1987 CES Software Showcase Award.

From the author of **Fontmaster II** comes **Fontmaster 128**, an enhanced version for the Commodore 128. This powerful word processor with its many different print styles (fonts), turns your dot matrix printer into a more effectual tool. Term papers, newsletters, and foreign languages are just a few of its many applications.

- * Program disk with no protection - uses hardware key
- * Supplement disk includes foreign language fonts
- * 56 Fonts ready to use
- * Font editor/creator included
- * On screen Font preview
- * 80 column only
- * Supports more than 110 printers
- * *Includes a 102,000 word Spell Checker*

Only **£49.95** incl

* Insert graphics within text or superimpose text over them & turn this package into a Desk Top Publisher. Clip-Art disk with 110 images £5

NEW: The Commodore 1581 3½ inch - fast data transfer rate (8000 cps with the 128; 900 cps with the 64) - full CBM compatibility with the 128/64 serial drive - 6502 processor running at 2MHz for program, Sequential, Relative and C/PM filing - MFM format. Must be a bargain at £199.95 (P&P £3). We can supply FONTMASTER 128 in 3½ inch format.

* Sole UK importers and distributors are BYTES & PIECES, 37 Cecil Street, Lytham, Lancashire, FY8 5NN.

HEY AMIGO...

NOW YOU DON'T HAVE TO BE A BANK ROBBING BANDIT TO AFFORD AN AMIGA!

AMIGA A500

1Meg. Disk Drive 4096 Colours Stereo Sound
Built-In Speech Synthesis Multi-Tasking

- FREE - 10 Public Domain Disks Worth £39.95
- FREE - Amiga Handbook Worth £7.95
- FREE - Deluxe Paint Worth £24.95
- FREE - Mouse Mat Worth £7.55
- FREE - TV Modulator Worth £24.95
- FREE - Karate Kid II Worth £24.95
- FREE - Amiga Tutorial Disk

£ CALL FOR LATEST PRICES
AMAZING SAVINGS!

AMIGA 2000

With extra 1Meg. Internal Drive FREE
(phone for details)

AMIGA SOFTWARE

ELECTRONIC ARTS and many more
Always in Stock - Phone Now

New...

AMIGA EXTERNAL DISK DRIVES

COMMODORE 1Meg. £249.95 - SAVE OVER £43
CUMANA 1Meg. £139.95 - SAVE OVER £6
BUY A DRIVE NOW & GET 5-FREE Blank Disks

AMIGA PRINTERS

CITIZEN 120D
Low Cost NLQ Dot Matrix Printer
2 Year Warranty
C64 and Amiga Compatible
£199 Save Over £95

SEIKOSHA SL80 AI
24 Pin Dot Matrix
Perfect Letter Quality
Single Sheet Paper Loader
16K Buffer
Ideal for W.P. and D.T.P.
£399 Save Up To £32

SEIKOSHA MP1300 AI
Extremely Fast 300 CPS
Dot Matrix Printer & NLQ
Single Sheet Paper Loader
7 Colour Kit Available
10K Buffer
RS232 Interface as Standard
£499 Save Up To £35

All printers are:
Supplied With FREE CONNECTOR CABLE
(please specify computer)
Friction AND Tractor Fed
Epson/IBM Compatible

HARWOODS "DUALPACK" DEAL

Amiga A500 AND Monitor
And FREEBIES
ONLY £785
(Save Up To £249!)

Amiga/Philips Monitor

14" Colour - Medium Resolution
Plugs Straight In (To Amiga And Most Other Computers)
Tilting Facility - Stand Available
Green Screen Switch
Stereo Sound (Philips)
ONLY £299 Save Up To £102
NOW WITH FREE - CONNECTOR LEAD
(To Fit Most Computers...
Please State Type When Ordering
eg. ACORN, ATARI, COMMODORE, IBM, MSX, SINCLAIR etc. etc.)

GORDON HARWOOD
HARWOOD
HARWOOD
HARWOOD
Computers
DEPT YC

12-36 Month H.P. TERMS AVAILABLE
All Prices Include VAT Postage, And Are Correct At Time of Going To Press E&OE Offers Subject to Availability

69 - 71 High Street Alfreton Derbys TEL 0773·836781

Official Commodore Business Centre

Enlarging the C64

Create User Definable Graphics to produce enlarged characters on your C64.

By Adam Wright

This program will enlarge any character up to a maximum square size of 6(width) by 6(height). In fact, as long as the combinations of width and height when applied to the formula (width-1)*8*(height)+1 is less than 256 then other size combinations can be created. If you can take into account the massive amount of memory that is used when creating enlarged characters then I'm sure that you will appreciate that the size combinations available are very acceptable

The program creates UDG's (User Definable Graphics) which when pieced together in the correct order will produce the enlarged character. This program therefore works in the normal low-res screen mode. One advantage of this method of creating enlarged characters is that no hi-res screen areas have to be assigned. The disadvantage of this method is that the total number of characters redefined must not exceed 255. One way to overcome this limitation is to create the enlarged characters that are going to be used beforehand.

Getting it all in

In order to enter correctly the Enlarge program the following steps have to be taken:

- Enter program 1.
- Run the program making sure there are no errors.
- Save the program (SAVE "PROGRAM 1",1).*
- Save the code by typing SYS 49853 "ENL CODE",49152,49977,1*
- Enter program 2.
- Save the complete program (SAVE "ENLARGE",1*).

*Disk Users replace the 1 with an 8

How to use the routines

Enlarge Character
This is the main routine which as its name suggests, enlarges characters. Routines that must be called before calling this routine are:
Data Store, Character Data, Width, Height
SYNTAX – SYS EC

Print Character
This routine puts the enlarged character on the screen. Note that the kernal print routine could not be used because as you well know, some ASC codes do things like clear the screen, etc, therefore the characters are 'POKED' into screen memory.
Routines that must be called before calling this routine are:
Character Colour, Base Character, XY Position, Width, Height
SYNTAX – SYS PC

Data Store
This routine is used to set up the address for the enlarged characters – (default 12288)
SYNTAX – SYS DS, enlarged character address

Character Data
This routine tells the computer where the 8 bytes of character definitions are – (default 14336)
SYNTAX SYS CD, character definition address

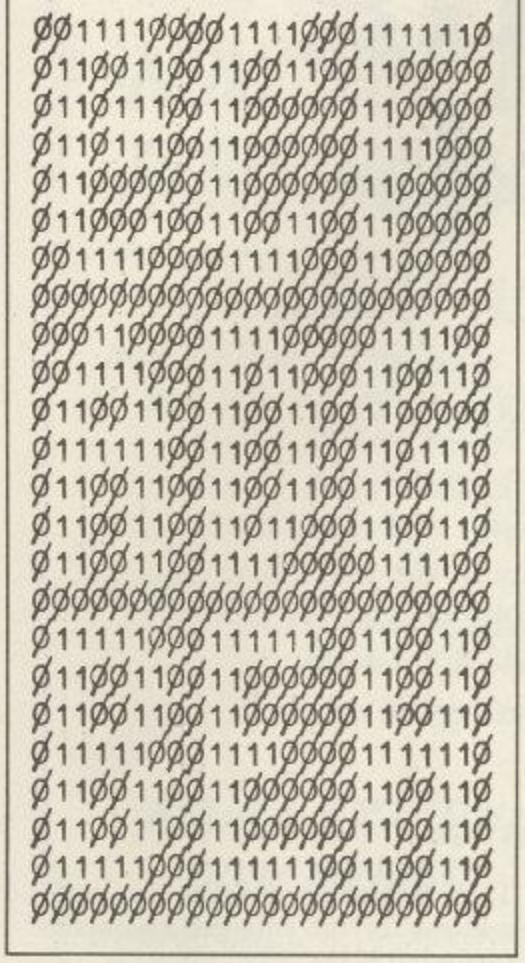
Character Colour
This routine simply changes the current enlarged character colour.
SYNTAX – SYS CC, colour of character

Basic Character
This routine changes the initial character that is used as the base for the Print Character routine. (See example 1)
SYNTAX – SYS BC, base character number

XY Position
This routine changes the enlarged character coordinates.
(Not to be confused with *CURSOR MOVE*)
SYNTAX – SYS, XY, X coordinate, Y coordinate

Width and Height
This routine sets up the width and the height of the character to be enlarged.
SYNTAX – SYS WH, width of character, height of character

Example 1
Base Character



Memory Copy
This routine will copy a designated area of memory to another. (Useful for copying character sets).
SYNTAX – SYS MC, start address, destination address, number of bytes to be copied

Memory Fill
This routine will fill an area of memory with a specified byte. (Useful for clearing screens.)
SYNTAX – SYS MF, start address, number of bytes to be filled, byte to fill with.

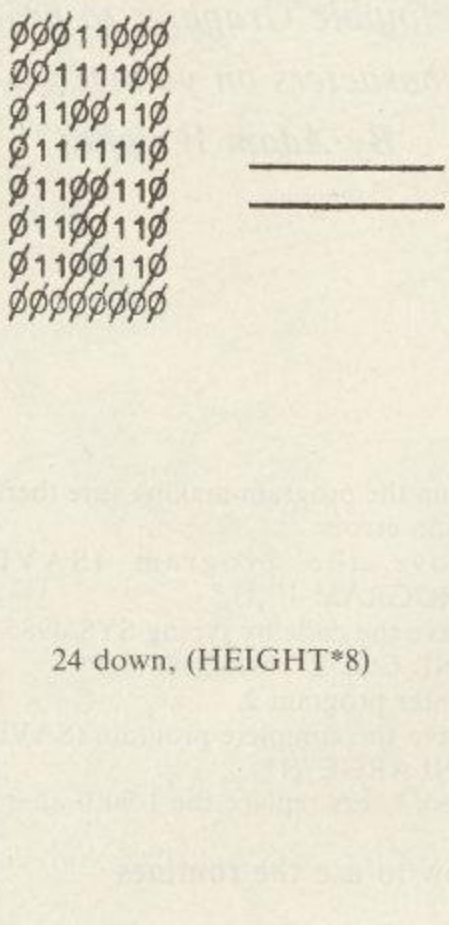
Cursor Move
This routine will place the cursor at any position. (No more "QQQR").
SYNTAX – SYS CM, Horizontal position, Vertical position

Memory Save
This routine will, as its name suggests, save a portion of memory to the current output device. (Tape users can omit the device number.)
SYNTAX – SYS MS "filename", start address, and address, device number

Memory Load
This routine will load a file from the current input device into the computer at the specified start address.
SYNTAX – SYS ML, "filename", start address, device number, secondry address (if required)

Examples of Enlarged Characters

E.G 1. ASC("A"),WIDTH=3, HEIGHT=



24 down, (HEIGHT*8)

8 bits : 8 bits: 8 bits:
(24 bits wide – 3 bytes)

Enlarge Routines Checklist

TITLE	SYNTAX	PARAMETERS	PARAMETER RANGES	ADDRESS
Enlarge Character	SYS EC	None		49154
Print Character	SYS PC	None	-	49508
Data Store	SYS DS,N	N Enlarged Character address	0-65535	49609
Character Data	SYS CD,N	N Character Definition address	0-65535	49625
Character Colour	SYS CC,N	N Colour of Character	0-225 (MOD 16)	49635
Base Character	SYS BC,N	N Base Character number	0-225	49642
XY Position	SYS XX,X,Y	X,Y, Coordinates	0-39,0-24	49649
Width, Height	SYS WH,W,H	W,H, Width and Height	1-255,1-255	49679
Memory Copy	SYS MC,S,D,N	S, Start, D Destination, N Number	0-65535,0-65535,0-65535	49769
Memory Fill	SYS MF,S,N,B	S Start, N Number, B Byte	0-65535,0-65535,0-255	49798
Cursor Move	SYS CM,H,V	H,V Horizontal and Vertical	0-39,0-24	49824
Memory Save	SYS MS", S,E,D	"filename", S Start, E End, D Dev	0-65535,0-65535,1 or 8	49853
Memory Load	SYS ML",S,D,S	"filename", S Start, D Dec, S Sa	0-65535,1 or 8,0-15	49922

SUBSCRIPTIONS SENSATIONS!

AT COVER PRICE ONLY!

Any of the magazines from the list below can be delivered to your door with : NO handling charge NO postage costs

A&B Computing	£18.00
Aeromodeller	£22.20
Citizens Band	£16.20
Clocks	£27.00
Commodore Disk User	£15.00
Disk User	£13.72
Electronics Digest	£11.00
Electronics Today International	£16.80
Ham Radio Today	£15.60
Military Modelling	£15.60
Model Boats	£15.60
Model Engineer	£26.40
Photography	£15.00
Photoplay	£12.00
Popular Crafts	£16.20
Radio Control Model Cars	£16.20
Radio Control Boat Modeller	£7.50
RCM&E	£14.40
Radio Control Scale Aircraft Quarterly	£9.00
Radio Modeller	£14.40
Sea Classic International	£11.70
Scale Models International	£15.00
Video Today	£15.00
Which Video?	£15.00
Woodworker	£15.60
Your Commodore	£14.40
Model Railways	£13.20
Practical Wargamer	£7.80

The Above Prices Refer to U.K. Subscriptions Only

This offer is also open to existing U.K. subscribers who may wish to extend their current subscriptions.

Please commence my subscription(s) To.....with the.....Issue
I enclose my cheque/postal order for £.....made payable to Argus Specialist Publications Ltd.
or debit £.....from my Access/Barclaycard No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]
valid from.....to.....Signature.....
Name.....
Address.....
.....

Send this form with your remittance to:
INFONET LTD. (N.R.S. 88) 5 River Park Estate, Berkhamsted, Herts. HP4 1HL.

2 issues FREE

When you take out a subscription to any of these magazine

	EUROPE	MIDDLE EAST	FAR EAST	REST OF THE WORLD
A&B Computing	£27.30	£27.60	£31.10	£28.30
Aeromodeller	£27.00	£27.20	£29.00	£27.50
Citizens Band	£20.10	£20.30	£21.80	£20.50
Clocks	£32.40	£32.60	£34.70	£33.00
Commodore Disk User	£18.00	£18.20	£19.30	£18.40
Disk User	£21.60	£21.70	£23.20	£22.00
Electronics Digest	£12.90	£13.00	£13.70	£13.10
Electronics Today International	£21.00	£21.20	£22.80	£21.50
Ham Radio Today	£20.10	£20.30	£22.00	£20.60
Military Modelling	£22.40	£22.60	£25.20	£23.10
Model Boats	£20.00	£20.10	£21.80	£20.40
Model Engineer	£35.40	£35.70	£39.00	£36.30
Photography	£22.00	£22.30	£25.00	£22.80
Photoplay	£16.70	£16.90	£18.70	£17.20
Popular Crafts	£21.40	£21.60	£23.60	£22.00
Radio Control Model Cars	£21.10	£21.30	£23.10	£21.60
Radio Control Boat Modeller	£10.00	£10.20	£11.10	£10.30
RCM&E	£20.40	£20.60	£22.90	£21.00
Radio Control Scale Aircraft Quarterly	£11.10	£11.20	£12.00	£11.30
Radio Modeller	£20.00	£20.20	£22.40	£20.60
Sea Classic International	£10.70	£10.80	£12.00	£11.00
Scale Models International	£19.60	£19.80	£21.50	£20.10
Video Today	£20.20	£20.40	£22.30	£20.70
Which Video?	£19.40	£19.50	£21.20	£19.80
Woodworker	£22.80	£23.00	£25.70	£23.50
Your Commodore	£22.00	£22.30	£25.20	£22.80
Model Railways	£19.10	£19.30	£21.50	£19.70
Practical Wargamer	£7.10	£7.20	£8.00	£7.40

The Above Offer Applies to Overseas Subscriptions Only

This offer is also open to existing subscribers who may wish to extend their current subscriptions.

Please commence my subscription(s) To.....with the.....Issue
I enclose my cheque/postal order for £.....made payable to Argus Specialist Publications Ltd.
or debit £.....from my Access/Barclaycard No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]
valid from.....to.....Signature.....
Name.....
Address.....
.....

Send this form with your remittance to:

INFONET LTD. (S.O. 88) 5 River Park Estate, Berkhamsted, Herts. HP4 1HL.

screen of the VDC quite easily, but you have to remember BASIC isn't prepared for this, so you may have to write specialist routines to make this possible. First let's try to make the screen smaller horizontally by:

POKE 54784,1:POKE 54785,75

The number of characters displayed has changed to 75, but it doesn't quite work because the spare five columns are printed on the next line. So we must store five to register 27:

POKE 54784,27:POKE 54785,5

This solves the problem by adding five lines to make the total equal 75+5=80. The maximum number of characters is 80. We can also change the number of vertical characters using register 6:

POKE 54784,6:POKE 54785,10

No problems this time. The rest of the screen is swallowed up – even though it is still there if you store 25 in register 6. Now try this:

POKE 54784,6:POKE 54785,26

Wow! We now appear to have 26 lines, although they can't be used yet, and probably contain garbage. In fact we can have up to 32 lines although some monitors may not be able to display them all, so it's best just to add a few. Also, if you change the size of the screen it would be useful if you could centre the display. Well, you can of course. Just use registers 2 and 7 to change the horizontal and vertical syncs respectively. It's best to experiment and I would recommend that your programs that change the size of the screen allow individual users to alter the syncs for their individual monitors.

Like the 40 column screen, the 80 column has an attribute screen, but with some added features. Each of the 2000 bytes (see fig six) affect the corresponding byte of screen RAM, the individual bits mean:

(see Figure 11)

Alt: indicates which character set is in use.
Rvs: Reverses characters, but not used by KERNAL.
Und: Is used to underline characters (CTRL B).
Fla: This bit flashes characters on and off.
Bits 0 – 3 are used for the sixteen colours.

It is also possible to change the position of the screen and the

Figure 5

Copying the VDC RAM from place to place. Store the destination address at 250 and 251, the number of bytes in Acc. Also, store the source address in 252 and 253.

```
.copy   PHA          /temp store number of
        LDX #24      /bytes then set
        JSR read     /copy
        ORA  128     /bit
        JSR write    /and write.
        LDX #18      /store
        LDA 251      /destination
        JSR write    /address
        INX          /high
        LDA 250      /then
        JSR write    /low.
        LDX #32      /store
        LDA 253      /source
        JSR write    /address
        INX          /high
        LDA 252      /then
        JSR write    /low
        PLA          /get number
        LDX #30      /of bytes
        JSR write    /and store
        RTS          /return
```

Figure 6

VDC RAM organisation

$0000	– $07CF	Video RAM, 2000 bytes.
$07D0	– $07FF	Not used.
$0800	– $0FCF	Attribute RAM, 2000 bytes.
$0FD0	– $1FFF	Not used.
$2000	– $3FFF	Character RAM, 8192 bytes, two character sets, 16 bytes per character (8 not used).

Figure 7

Altering underline scan line.

```
 10  graphic 5,1
 20  for t=0 to 24
 30  char, 24,t,chr$ (2)+"How to under line text
     on the VDC"
 40  next t
 50  do
 60  :for t=1 to 8
 70  :poke 54784,29:rem "register 29"
 80  :poke 54785,t
 90  :for d=1 to 25:REM "delay loop"
100  :next d
110  :next t
120  loop
```

attributes, as long as you tell the interpreter, which gets the information from around about $A2F in zero page. You will need to do this if you enlarge the screen. You change these via locations 12 and 13 (screen), 20 and 21 (attributes) of the VDC.

For those proud owners of monochrome monitors you can do away with the attributes altogether and use register 26 for the foreground and background colours. To do this you must clear bit 6 of register 25:
POKE 54784,25:POKE 54785,7

No difference? Well, not yet, but try the program from figure eight. Removing the attributes also allows you to utilise more memory for anything else.

Another feature of the VDC is the ability to change the size of the characters. This could be used as a special effect or just to amaze your friends! The registers controlling the size of the characters are 22 and 23 (bits 0-3). However, at present the system can only display up to a maximum of 8 by 8 pixels. But there are 16 bytes per character in the RAM so does this mean that a larger grid is possible? Try this:

```
1 POKE 54784,9:POKE 54785,15
2 POKE 54784,6:POKE 54785,16
3 POKE 54784,23:POKE 54785,15
4 POKE 54784,4:POKE 54785,19
5 POKE 54784,7:POKE 54785,18
RUN
```

So, it is possible to display an 8 by 16 grid, but what about 16 by 8. I'm afraid I haven't figured out how to do this, and I don't think it's possible.

Remember smooth scrolling on the VIC, well it's also possible on the VDC, using registers 24 and 25 for vertical and horizontal scrolling respectively. Notice that 16 bits can be scrolled in the horizontal plane. If bit 4 of register 24 is set then only 22 lines (as opposed to 25) are displayed so you can scroll the next three on. Also, you don't lose lines when scrolling on the VDC, try the program in figure nine.

The cursor is, as mentioned before, controlled by the VDC and has several registers controlling it, namely 14, 15, 10 and 11. Registers 14 and 15 define the address the cursor is at. Register 10 bits 5 and 6 indicate the cursor mode:
00 – The cursor is still.
01 – The cursor is off.
10 – Fast blinking.
11 – Slow blinking.

Bits 0-4 indicate the top line of the cursor, because you can define it as underline, overline, solid, or anything you like. Register 11 defines the end

Figure 8

Changing the character size.

```
10  graphic 5,1
20  input "What is your name';nm$
30  nm$=" : "
40  n%=2000/len (nm$)
50  scnclr
60  poke 54784,22:poke 54785,112
70  poke 54784,23:poke 54785,0
80  for t=1 to n%
90  print nm$;
100 next
110 for n=1 to 10
120 for x=0 to 8
140 poke 54784,22:poke 54785,112+x
150 poke 54784,23:poke 54785,x
160 for d=1 to 30
170 next d,x,n
180 sleep 5
190 end
```

Figure 9

The VDC scrolling registers.

```
10  graphic 5,1
20  fast
30  for t=0 to 24
40  char,27,t,"Hello all you C128 owners!"
50  next
60  do
70  :for t=0 to 7
80  :poke 54784,24
90  :poke 54785,32+t
100 :for d=1 to 60
110 :next d,t
120 loop
```

Figure 10

The cursor mode.

```
10  fast
20  poke 54784,11:poke 54785,5
30  for m=9 to 96 step 32:rem "bits 5 and 6"
40  poke 54784,11:poke 54785,2+m
50  for x=0 to 79
60  poke 54784,14:poke 54785,0
70  poke 54784,15:poke 54785,x
80  for=1 to 20:rem "change delay to suit
    yourself"
90  next d,x,m
100 end
```

scan line. Both are from 0 to 15. See figure 10 for an example of the cursor modes.

And now we come to the highlight of this article. Want to know a secret? HIGH RESOLUTION GRAPHICS! Yes, bit 7 of register 25 defines text or graphics mode and normally the hi-res mode is 640 by 200. This is comparable to the BBC mode 0 graphics, and is quite impressive. However, you will have to write your own graphics routines as Commodore forgot, although I saw a package at a Commodore show which could handle hi-res graphics in 80 column mode. Try this:

```
POKE 54784,25:POKE 54785,135
```

However, if you want to use 16384 bytes instead of 16000 then try this:

```
1 POKE 54784,1:POKE 54785,64
2 POKE 54784,2:POKE 54785,96
3 POKE 54784,6:POKE 54785,32
4 POKE 54784,7:POKE 54785,36
5 POKE 54784,25:POKE 54785,135
```

This gives graphics of resolution 512 by 256. I use this a lot more because you can use a technique used on the BBC. Remember registers 12 and 13? Append this to the above program:

```
6 DO
7 FOR T=0 TO 63 STEP 2
8 POKE 54784,13:POKE 54785,T
9 FOR S=0 TO 49:NEXT S,T
10 LOOP
```

What this program does is move the start of the screen, and as the screen takes exactly 16K bytes then it will wrap around in memory. This is a great feature and scrolling becomes easy. The procedure would be to change the start of the screen instead of scrolling memory, which makes scrolling easy and quick. Also, if Commodore had thought to give the VDC some more memory (quite possible), say 32K bytes then it would have been possible to have displayed 640 by 400 or 512 by 512 pixels resolution using the interlaced graphics mode on register 8. Try poking 255 to this register!

Well, that's all I have to say about the VDC, and I assure you that there is a lot left to find out, and special effects to find. One final possibility that I thought about was to use the 16K bytes as storage for music data, etc. Also, you can use the VDC in 64 mode (as well as the 2 MHz mode). For other information on the VDC refer to one of the good C128 reference guides or The Anatomy of the Commodore C128. YC

Figure 11

A complete list of the VDC registers.

0	:	(126)	:total number of characters/line including beam return.
1	:	(80)	:Number of characters displayed across screen.
2	:	(102)	:Left border sync. Increasing this register moves the screen left.
3	:	(73)	:Sunc width. Bits 0-3 determine hor. sync pulse width in characters, bits 4-7 determine vert. sync pulse width.
4	:	(39)	:Total number of lines including beam return.
5	:	(224)	:Fine adjustment for register 4.
6	:	(25)	:The number of vertical lines displayed.
7	:	(32)	:Upper border sync. Increasing this moves the screen up and decreasing it moves the screen down.
8	:	(252)	:This register determines the interlace mode.
9	:	(231)	:Bits 0-4 determine the number of raster lines/ character minus one. The default is 7 (bits not used appear as 1) meaning 8.
10	:	(160)	:Bits 5-6 set cursor mode and bits 0-3 set cursor start raster.
11	:	(231)	:The line at which the cursor ends is held in bits 0-4 (normally 7).
12	:	(0)	:The high byte of the address of the screen.
13	:	(0)	:The low byte of the address of the screen.
14	:	(???)	:The high byte of the cursor position.
15	:	(???)	:The low byte of the cursor position.
16	:	(???)	:The vertical address of the light pen.
17	:	(???)	:The horizontal address of the light pen.
18	:	(???)	:The high byte of the address to be copied, written to or read from.
19	:	(???)	:The corresponding low address of REG 18.
20	:	(8)	:The high byte of the attribute screen.
21	:	(0)	:The low byte of the attribute screen.
22	:	(120)	:Bits 4-7 determine the number of displayed horizontal lines (7). Bits 0-3 determine the number of vertical displayed lines (8).
23	:	(232)	:Number of vertical lines displayed (height)
24	:	(32)	:Bit 7 tells VDC whether copying, reading or writing. Bit 6 is the REVS bit, used by <ESC> R and <ESC>N. Bit 4 swallows up the last three lines of text on vertically. Bits 0-3 are used for vertical scrolling.
25	:	(71)	:Bit 7 indicates high or low res. mode. Bit 6 indicates the use of attributes. Bit 5 determines semi-graphic operating mode. Bit 4 indicates double width characters. Bits 0-3 are for horizontal scrolling.
26	:	(240)	:When in monochrome mode (bit 6 of REG 25), bits 0-3 determine background colour, and bits 4-7 indicate foreground colour.
27	:	(0)	:The number of characters added to the end of each line. If you make the screen smaller you must make sure REG 1+REG 27=80.
28	:	(47)	:Character base address (bits 5-7) in 8K steps.
29	:	(231)	:Indicates which line to underline, and can be from 0-15.
30	:	(???)	:Number of bytes to be copied or stored.
31	:	(???)	:Holds data for reading or writing to RAM.
32	:	(???)	High byte of start address of block to copy
33	:	(???)	Low byte of start address of block to copy
34	:	(125)	:Number of characters from start of line to first character to be displayed. Can be used to cover left edge of screen.
35	:	(64)	As REG 34 but for right edge of screen.
36	:	(245)	:Bits 0-3 indicate the DRAM refresh rate.

Cut Price Disks from Direct Disk Supplies

from only £10.99 for 20 disks delivered to your door.

Cash 'n Carry prices on disks from Direct Disk Supplies

OFFER 1 Premium Universals *One disk for all reasons!*

The Premium Universal disk tested to DSDD 96tpi – suitable for all drives needing high quality media. (SSDD, DSDD 40/80 track)

25 disks	£ 14.99
50 disks	£ 27.99
100 disks	£ 49.99
200 disks	£ 96.99
250 disks	£119.99
500 disks	£229.99
1000 disks	£399.99

Packed in 25's, complete with envelopes, labels, WP tabs and hub-rings. Disks individually certified and tested (on both sides) to 96tpi means no problems and higher reliability. Lifetime Warranty.

ALL PRICES INCLUDE VAT & DELIVERY TO YOUR DOOR! NO HIDDEN EXTRAS

OFFER 2 Rainbows

Sets of 5 colours in each pack. Universal coloured disks to code your files and programs. Without doubt the best value coloured disks on the market. (SSDD, DSDD 40/80 track)

25 disks	£ 18.99
50 disks	£ 35.99
100 disks	£ 69.99
200 disks	£129.99
250 disks	£149.99
500 disks	£279.99
1000 disks	£499.99

Packed in 25's, complete with envelopes, labels, WP tabs and hub-rings. Disks individually certified and tested (on both sides) to 96tpi means no problems and higher reliability. Lifetime Warranty.

OFFER 3 Flippies

This is the disk for turning!

Reversible disk tested both sides. 2 notches and 2 index holes. Idea! for BBC, APPLE, Commodore etc.

25 disks	£ 18.99
50 disks	£ 35.99
100 disks	£ 69.99
200 disks	£129.99
250 disks	£149.99
500 disks	£279.99
1000 disks	£499.99

Packed in 25's, complete with envelopes, labels, WP tabs and hub-rings. Disks individually certified and tested (on both sides) to 96tpi means no problems and higher reliability. Lifetime Warranty.

OFFER 4 HIgrade Doubles & PC Preformatted

	HIgrade Doubles	PC Formatted
25 disks	£ 12.99	£ 18.99
50 disks	£ 23.99	£ 35.99
100 disks	£ 45.99	£ 69.99
200 disks	£ 89.99	£129.99
250 disks	£105.99	£149.99
500 disks	£199.99	£279.99
1000 disks	£359.99	£499.99

Premium quality, individually certified to DS 48tpi. Made for the PC, giving premium quality at budget prices.

Why not spoil yourself, and buy them formatted – a little extra saves a lot! There's never a disk formatted when you need it.

OFFER 5 Bargain Box

Price per order qty.		Approx price per disk ex-VAT (infor only)
20 disks	£ 10.99	48
40 disks	£ 19.99	44
60 disks	£ 28.99	42
80 disks	£ 36.99	40
100 disks	£ 42.99	38
200 disks	£ 82.99	36
500 disks	£199.99	35
1000 disks	£389.99	34

Branded SCOTCH (made by 3M) SSDD 48tpi at prices below other people's plain label. Certified error free and tested by 3M; disks have hub-rings, tyvek envelopes and labels.

Stocks are decreasing rapidly, these have been extremely popular.

OFFER 6 – 3.5" Media Life Disks

NEW LOWER PRICES

Qty	SS	DD
10	£ 13.99	£ 15.99
20	£ 26.99	£ 29.99
50	£ 64.99	£ 73.99
100	£119.99	£ 139.99
200	£229.99	£ 269.99
250	£279.99	£ 329.99
400	£429.99	£ 519.99
500	£499.99	£ 599.99
1000	£949.99	£1099.99

3.5" disks in plastic library boxes.

Made by a leading manufacturer, all our disks are individually certified to 135tpi.

Don't forget the price includes VAT, delivery and library boxes!

OFFER 7 3M & Verbatim

5.25" disks 3M/Verb

SSDD 48tpi	744/525	20 disks £25.99
DSDD 48tpi	745/550	20 disks £29.99
DSDD 96tpi	747/557	20 disks £37.99
DSHD 96tpi	799/HD	20 disks £49.99

3.5" disks

SSDD 135tpi	20 disks £39.99
DSDD 135tpi	20 disks £49.99
DSDD High Density	10 disks £49.99

Includes VAT and delivery.

Brand Leaders at Cash 'n Carry prices

If these are your favourite, then don't miss our CRAZY low prices for 20 disks. Remember there's no extras, just terrific value.

Same day despatch – at no extra cost

OFFER 8 HI-flyers

PC-AT High Density Disks made by one of our major manufacturers. Suitable for PC-AT and other High Density drives. Lifetime warranty.

Total price (no extras)

20 disks	£ 32.99
40 disks	£ 62.99
60 disks	£ 89.99
80 disks	£119.99
100 disks	£139.99
200 disks	£259.99
500 disks	£599.99

OFFER 9 3" CF2 disks

Maxell or Panasonic 3" CF2 disks

10 disks	£ 25.99
20 disks	£ 49.99
50 disks	£109.99
100 disks	£209.00

VAT & carriage included.

OFFER 10 Box Clever

Safe! Clean! Tidy!

Sixers – 6 stylish plastic library cases for 10 disks. VAT & carriage included.

3.5"	Slimpak	£8.99
5.25"	Vision-10	£8.99

Lockable Boxes

3.5"	TDS040	40/50 disk box	£ 9.99
	TDS080	80/90 disk box	£12.99
5.25"	TDS050	50 disk box	£ 9.99
	TDS100	100 disk box	£12.99

IBM parallel printer cable £9.99

VISA ACCESS

How to order

1. DIAL-A-DISK ON 01-979 7811, and give your ACCESS or VISA number and expiry date.
2. Send your cheque etc. to Direct Disk Supplies Ltd.,
3. Official Orders, Bona-fide orders from Universities, Colleges, Schools, Charities, etc are very welcome.
4. Cash orders, no minimum value.
   Account orders, minimum value £30.

DIAL-A-DISK 01-979 7811

Direct Disk Supplies Ltd.

Dept YC1 , FREEPOST, 129 High Street, Hampton Hill, Middlesex TW12 1BR

Array Display Subroutines

Create a screen input and display routine which acts on string arrays, with this handy program.

By Paul Williams

When writing business packages or other programs for serious applications, it is often necessary to have screen layouts containing a lot of data all at the same time (for example one record in a database program or the description of one item in a stock control package).

The best way of entering and modifying the data is for the user to be able to move a cursor around the various fields on the screen, using the screen editor to amend the data. However, the cursor must not be allowed to stray outside each field, otherwise it would be very easy for the user to corrupt the screen, and if the user were not familiar with computers, become very confused.

The program described here is a screen input and display routine which acts on string arrays, providing the following advantages over the normal Basic INPUT command, while still being easy to use.

1. The programmer defines the field positions and sizes on the screen, and it is impossible for the user to stray out of these fields when editing.
2. When editing, the current field is highlighted to show the user the maximum size of entry expected by the program.
3. Left and right cursor controls, home, clear and insert and delete can all be used when editing, but only effect the current field, even if other fields are present on the same screen line.
4. Up and down cursor movements automatically move the user to the previous and next fields on the screen.
5. Apart from the allowed control characters, only letters, digits and characters such as ! and % etc are accepted.
6. Quotes, commas and colons are all readily accepted as legitimate input characters, and do not cause ?EXTRA IGNORED errors.
7. The programmer can specify that editing is restricted to one particular field, or all the fields on the screen.
8. All the fields on the screen can be displayed or cleared with one command. Also, editing the whole screen is performed with just one command.
9. The whole system produces very neat screen displays, allowing editing to a professional software standard.

The program relies on three one-dimensional arrays for its operation; a field position integer array P%, a field length integer array L%, and a data array S$ containing the information to be displayed and modified. The array names are arbitrary – you can use any letters but the two numeric arrays must be integer.

Array P% contains the displacement of each field from the top left home position on the screen, e.g. the first column on the second screen line is a displacement of 40 from the top, and the middle of the bottom line is 980. Thus, P%(1) defines the location of field 1, and P%(2) defines that of field 2.

Array L% defines the maximum length of each field – this number determines the size of the highlighted area on the screen and the number of characters strings are truncated to when being displayed by the routine. L%(1) contains the length of the first field, and so on.

It is also necessary to set L%(0) to the number of fields present on the screen.

**Array S$** simply contains the ASCII strings of data to be displayed; the routine directly modifies the elements of S$ when editing is taking place.

Once the arrays have been defined, the subroutine is executed in this way:

SYS49152,P%(0),L%(0),S$(0)

(or whichever array names you have chosen) displays the elements of S$ in their respective fields.

SYS49155,P%(0),L%(0),S$(0)

allows the user to edit the data in the fields on the screen. The user can move between fields with the cursor up and down controls, and when RETURN is pressed the data in the fields is put back into the elements of array S$. Editing and movement can be restricted to, say field N by P%(0)=N before the above SYS command. If P%(0)=0, editing is allowed in all the fields.

SYS49158,P%(0),L%(0),SS(0)

clears all field areas on the screen.

The main advantage of this system over normal INPUTs is that if the user has a lot of data to enter on the screen, it is possible to get to the end of the screen, then decide the top record needs modifying, and the cursor controls can be used to skip across the fields to reach that field. The Basic program is held up until the user is completely satisfied with the whole screen; then he/she presses RETURN and all the data is returned to the Basic program in one go.

The machine code program occupies locations $C000 to $C326 (hex), and a Basic loader is listed. This contains checksums which will point out typing errors when this program is run. Once the program has been installed using this loader, your Basic program can make full use of the package. To demonstrate how the routine is used, a Basic program has been included which draws up a typical stock-control screen and allows full-screen editing restricted to the defined fields. The program is fully commented and should need no further explanation.

The routine is ideal for taking the struggle out of writing business-type packages – after all databases and such like can quite easily be written effectively in Basic, as long as a foolproof and easy to use input routine is available – this program provides just that! YC

See listings on page 77.

STACK COMPUTER PRODUCTS

C64 C128 128D

- USE COMPATIBLE CARTRIDGES TOGETHER
- MODEM VERSION AVAILABLE

C64 128 128D VIC20

LIGHTPEN

- DRAW *ACCURATELY*
- SOFTWARE + 10 GAMES
- TAPE & DISK
- PRINT PICTURES

LISTING PAPER (1,000 sheets)

11 x 9½" £7.50
11 x 14½" £9.90

ALL CBM'S

DATASETTE

- 100% CBM COMPATIBLE
- COUNTER
- RECORD LIGHT
- C16/+4 ADAPTOR £2 EXTRA

C64 C128 128D

NEOS MOUSE & CHEESE

- TAPE £22.95
- DISK £22.95

1540 1541 1550 1570

NOTCHER

HALVE DISK COSTS

- Use both sides on single sided drives

3½" disks (10) in plastic cases

Single sided £13.50
Double sided £14.00

5¼" - LOCKABLE DISK STORAGE BOXES WITH RIGID INDEX SEPARATORS

C64 128's IN 64 MODE

- **EXPERT WITH ESM ... £29.95**
- **FREEZE MACHINE £28.95**

WE WILL ALWAYS SUPPLY THE LATEST VERSIONS

1540 1541 1550 1570 1571 128D

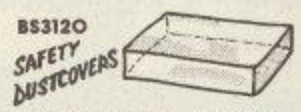
A • 10 SUPER DISKS IN LIBRARY CASE DSDD

B • 10 HIGH QUALITY IN POLYTHENE BAG

HIGH QUALITY RIBBONS

• MPS801	3.54
• MPS802	3.93
• MPS803	3.92
• 1525	3.35
• 1526	3.93
• DPS1101	3.52
• MX/FX80	3.78

ALL OTHERS AVAILABLE



FROSTERED-BLACK TRIMMED ANTI-STATIC FIRE RETARDANT

64/20/16	1.75
Plus 4	2.75
128	3.50
128D	4.50
C2N/1530/1531	1.50
1541/1570	3.00
1571	3.00
MPS801	3.00
1701	6.00

C64128 +4 VIC20 C128D

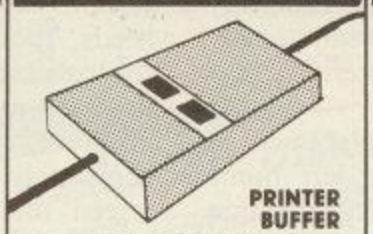
- CONNECT ANY 64/128
- SEND/RECEIVE

64128 +4 C16 VIC20 128D

1520 PRINTER/PLOTTER

PACK OF 4 PENS BLACK, RED, BLUE, GREEN.

ALL CBM'S



PRINTER BUFFER

- ALL CBM COMPUTERS
- ALL CBM PRINTERS
- 64K BUFFER..... £70
- 32K BUFFER..... £60

C64 128

INTERPOD

IEEE/R5232 — C64
- USE 4040/8050 DISKS ON 64/128
- BI-DI RS232

(IEEE LEAD £18)

CABLES

- DISK PRINTER.....£4.75
- TV LEAD..... £1.75
- USER PORT CENTRONICS..... £12.00
- AMIGA 500 PRINTER..... £12.00
- SERIAL SPLITTER.... £7.25
- RS232 (2 metres) £9.00

64 128 128D V20

RESET SWITCH

RESET & POKE USER PORT TYPE

NEW PRODUCT

USE DPS1101 ON IBM, AMSTRAD ETC.

CENTRONICS/C64 INTERFACE INCLUDING 8K BUFFER
CENTRONICS IN/CBM SERIAL OUT

SOURCE / DEST	IEEE 488	CBM SERIAL	CENTRONICS	RS232	CBM USER PORT
IEEE 488	33032	3900 A0031		38000	
CBM SERIAL	39000 A0031	92064 A0068	29008	9800 A0031	
CENTRONICS	32032 K0208	92088 A0068	22064	82064	A0003 A0043
R5232	38000 K0209	98000 A0031	28064	88120	A0012
CBM USER PORT				A0012	

INTERFACE MODEL-NUMBER-FINDER CHART

C64 128

- **ARROW + £11**
  - HIGH SPEED CASSETTE
  - M/C MONITOR
  - ASSEMBLER/DISASSEMBLER
- **SUPER HELP £12**
  - +20 BASIC COMMANDS
  - ASSEMBLER/DISASSEMBLER
  - MONITOR & D.O.S. SUPPORT
- **BLITZ COMPILER £15**
  - RUNS BASIC MUCH FASTER
  - ACCEPTS EXTENSIONS
  - SIMPLE OPERATION

- DISK CLEANER.....£7.50
- COPY HOLDER.....£15.90
- MONITOR SWIVEL 12".....£13.80
- MONITOR SWIVEL 14".....£17.25
- SURGE PROTECTOR.....£22.00
- LO-LINE CASE.....£19.95
- 1525 PAPER.....£23.80
- C16/+4 CASSETTE ADAPTOR...£3.75
- C16/+4 JOYSTICK ADAPTOR..£3.75

VIC MODULATOR

- 64 POWER SUPPLY.....£22.95
- C16 POWER SUPPLY.....£22.00
- +4 POWER SUPPLY.....£28.98
- 128 POWER SUPPLY.....£52.44

VIC 20

- 4 SLOT MOTHERBOARD SWITCHABLE £2.95
- 3/16K RAM PACK.....£34.95
- 3/16/32K RAM PACK.....£49.95

C16

- 16 RAM PACK £29.95

THIS IS A GENUINE LIMITED PERIOD SALE ENDING LAST DAY FEBRUARY 1988

FREE 40 PAGE CATALOGUE AVAILABLE ON REQUEST

PRICES INCLUDE VAT
P&P 90p U.K.
(FREE OVER £20)
OVERSEAS £3.00

MEEDMORE (Distribution) LIMITED
28 Farriers Way
Netherton
Merseyside L30 4XL
Tel: 051-521 2202

VISA

Software for Sale

If you think that one of our programs looks very interesting, but you can't afford the time to type it in then our software service will help you out.

It's three o'clock in the morning. You sit at the computer Keyboard having just finished a marathon typing session entering one of the superb programs from *Your Commodore*. Your fingers reach for the keyboard and press the letters R, U and N. You press RETURN, sit back and nothing happens.

Everyone has probably faced this problem. When it does happen it's a matter of spending hours searching through the program for any typing mistakes. No matter how long you look or how many people help you, you can usually guarantee that at least one little bug slips through unnoticed.

The *Your Commodore* Software Service makes available all of the programs from each issue on both cassette and disk at a price of £6.00 for disk and £4.00 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the relevant magazine. Should you not have the magazine then back issues are available from the following address:

INFONET LTD, 5 River Park Estate, Berkhamsted, Herts HP4 1HL.
TEL: (0447) 76661

Please contact this address for prices and availability.

The Disk

Programs on the disk will also be supplied as totally working versions, i.e. when possible we will not use Basic Loaders thus making use of the programs much easier. Unfortunately at the moment we cannot duplicate C16 and Plus/4 cassettes. However programs for these machines will be available on the disk.

What programs are available?

At the top of each article you will find a strap containing the article type, C64 Program etc. So that you can see which programs are available on which format, you will also find a couple of symbols after this strap. The symbols have the following meaning:

This symbol means that the program is available on cassette.

These programs are available on disk.

Please Note

Since the programs supplied on cassette are total working versions of the program, we do not put disk-only programs on tape. There is no sense in placing a program that expects to be reading from disk on to tape.

JULY 1987

UTILITY COMMANDS — This provides many vital commands missing from Basic 7.0 on the 128.
PLUS/4 AND C/64 CRUNCHER — Speed up your programs with these handy utilities.
PROGRAMMABLE FUNCTION KEYS — A utility to make more use of the function keys on the C64.
DISKIT 5 — A handy routine to convert memory to data statements on the C64. (Disk only.)
ARCADE ACTION — Get those sprites with these handy arcade routines on the C64.
CROSS REFERENCE — This program helps you sort out your variables on the C64.
SUICIDE RUN — A fast and stimulating game for the C64.

ORDER CODE
DISK YDJULY87 £6.00
TAPE YCJULY87 £4.00

AUGUST 1987

DISKIT 6 — Fast file copier for disk users. (C64 – disk only.)
SCREEN MAKER — Design text and low-res graphic screens with ease. (C64).
SCREEN DUMP — A Hi-Res screen dump for the C64 plus MPS801 printer.
NUMBER BASE TUTOR — A C64 educational program helping with tuition of number bases other than 10.
C16 SPRITE — Does your C16 lack something? Then add sprites with this useful utility. For C16 and Plus/4, available on disk only.
WINDOWS — A text window system for the C64.

ORDER CODE
DISK YDAUG87 £6.00
TAPE YCAUG87 £4.00

SEPTEMBER 1987

DISKIT 7 — Copy your disk programmes to turbo tape with ease. (C64 - disk only.)
PLUS/4 ANIMATED GRAPHICS — High-Res Animation for Plus/4 owners. (Disk only.)
SMOOTH VERTICAL SCROLLER — Professional titling for video owners. (C64)

ORDER CODE
DISK YDSEP87 £6.00
TAPE YCSEP87 £4.00

SPEEDY ASSEMBLER
Your Commodore's own assembler as used in our Byting into the 6510 series, complete with manual.

YSPASSD £9.95.

YSPASSC £9.95.

OCTOBER 1987

Shadow Boxing — Use the memory under the C64's ROMS for storage.
Adventure Kit — The first module of our DIY Adventure system. (C64)
Sprite Grabber — Grab Sprites from other programs and save them for later use. (C64)
Hide it — Program protection for C64 owners.

ORDER CODE
DISK YDOCT87 £6.00
TAPE YCOCT87 £4.00

NOVEMBER 1987

ADVENTURE KIT II — The second part of our C64 adventure writing kit.
KERNAL II — A pull-down menu system giving easy file handling. (C64)
FUNCTION KEY TEMPLATE — Use the Commodore plotter to produce templates on your C64.
PLUS/4 AND C16 DISK MENU — Access your disk files with ease (disk only).
128 PREFERENCES — Predefine your computer's default characteristics.
NUMBER TUMBLE — A frustrating game for the C64.

ORDER CODE
DISK YDNOV87 £6.00
TAPE YCNOV87 £4.00

Cassettes or disks are available from March 1986. Please ring the editorial office (01-437 0626) for details of these.

ORDER FORM – PLEASE COMPLETE IN BLOCK CAPITALS

NAME	QTY	TAPE/DISK	ORDER CODE	PRICE
JANUARY '87		TAPE (£4.00)	YC JAN 87	
JANUARY '87		DISK (£6.00)	YD JAN 87	
OVERSEAS POST £1				
			TOTAL	

NAME. . . . . .

ADDRESS. . . . . .

POSTCODE. . . . . .

I enclose a cheque/postal order for £. . . . . made payable to ARGUS SPECIALIST PUBLICATIONS LTD.

All orders should be sent to: YOUR COMMODORE, READERS SERVICES, ARGUS SPECIALIST PUBLICATIONS, 9 HALL ROAD, HEMEL HEMPSTEAD, HERTS HP2 7BH.
Please allow 28 days for delivery.

Evesham Micros

Now you don't have to put up with an old fashioned looking computer. Fit this smart & modern looking new case to your trusty '64 and it will feel like you are using a brand new computer.

- **Lower key height**
- **Modern styling**
- **Easy to fit**

This high quality injection moulded case really will transform your '64, so why put up with an old fashioned image, order one ***now.***

"...Fitting the case is simplicity itself and should present no problem to anyone with even a rudimentary knowledge of how to hold and use a screwdriver..."
YOUR COMMODORE

THE SLIMLINE '64

ONLY £19.95

Your '64 could look like this

THE Star PRINTERS FOR BUSINESS

£199.00

NL-10
New LOW price includes 2 spare ribbons FREE! (value £13.90)

This is the class printer in it's price category. The perfect choice for Commodore owners because the interface is changeable. So buy with the 64/128 cartridge then if you change computer at a later date just buy a new cartridge!

In a group test with other popular printers in the price category such as Epson, Citizen & OKI *What Micro* described the NL-10 as "THE ROLLS ROYCE OF THIS GROUP". Why settle for less? (Amiga users order with parallel cartridge, price includes cable).

- Auto single sheet feed
- Tractor & Friction feed
- "Front Panel" mode selection
- Interchangeable i/face cartridges
- Double & Quad height characters
- Low cost cut sheet feed
- Superb "NLQ"

Selected Products

DISK NOTCHER. Double your disk capacity, allows you to easily & accurately cut a second write protect notch..... **£4.95**

POWER PACK. Replacement power pack to suit '64..... **£24.95**

AZIMATE 3000. Check and adjust CBM cassette head alignment. Easy to use..... **£6.95**

MOTHERBOARD. 4 slot with either all upright or with one straight thro' for modem use, please state type when ordering..... **£28.00**

XETEC SUPERGRAPHIX. The best centronics i/face for 64/128. 8K buffer downloadable fonts etc. very good..... **£69.95**

DATA RECORDER. CBM compatible type. Same performance etc. as C2N/1531 but cheaper and with pause..... **£24.95**

1541C DISK DRIVE. We will sell you one but why not buy an Excelerator, less money and many advantages..... **£189.95**

We have a good stock of Commodore related equipment. If you don't see what you want please give us a call

AMIGA 500

In stock (voucher price).....£469.00
price includes Deluxe Paint, Silent Service, One on One (or similar) & 5 disks full of demos etc

Philips CM8833 *(STEREO)*
Monitor to suit A500....£279.00
(Price includes cable to suit)
Buy both together for.....£738.00

SPECIAL OFFER: PRICE NOW *INCLUDES* DOLPHIN COPY

DOLPHIN DOS

THE EFFECT IS STAGGERING.

Best Hardware Utility of year

The **established standard** parallel operating system for the 64/128 and 1541 disk drive. Now in use with most of the top software houses including **Gremlin, Software Projects, Thalamus, CRL Alligata, Superior etc. etc.** as well as many of the top independant software programmers

The speed and efficiency is **incredible**, who would believe that the humble old 1541 could load **202 blocks in less than 5 secs**. It is compatible with the majority of commercial software and can be switched out when necessary. One of the real pleasures of using this system is to use it with the likes of Easyscript & Superbase to speed up both the **normal loading and the sequential files**. It is important to point out that this is achieved using **standard** CBM disk format and not a special system, therefore you can still use your existing disks.

ONLY £69.95

INSTALLATION

Fitting involves fitting two sub assembly boards, one in the 64/128 and one in the 1541. Normally these just plug in but some '64s need a small amount of soldering.

EXTRAS AVAILABLE

User port expansion card.....**£14.95**
Kernal for '128 in '128 mode.....**£9.95**
Second drive assembly.....**£44.95**
Dolphin Copy (selection of copiers includes very powerful nibbler, extra fast unprotected and selective file).....**£7.95**

SOME OF THE FEATURES

- LOAD speed 25x normal (PRG)
- SAVE speed 12x normal (PRG)
- LOAD speed 12x normal (SEQ)
- SAVE speed 8x normal (SEQ)
- LOAD/SAVE 3x normal (REL)
- Easy & fast DOS commands
- Format 40 tracks (749 blocks)
- Monitor built in
- LOADs 202 blocks in 5 secs
- Enhanced screen editor
- Drives centronics printer
- Extra BASIC commands
- Compatible with standard DOS
- Can be switched out

Disks Boxes

25 bulk packed DS/DD disks. With sleeves, w/p tabs and labels. Good quality & fully guaranteed..... **£13.95**

25 disks + box. Disks as above plus 50 capacity locking storage box..... **£22.95**

25 disks + box. As previous offer but with 100 capacity locking box. A very popular offer..... **£24.95**

50 capacity box. High quality lockable disk storage. Smoked perspex top..... **£10.95**

100 capacity box. Larger capacity version of above..... **£13.95**

In Australia contact: Micro Accessories of S.A., Unit 8, Hewittson Rd, Elizabeth West, S. Australia 5113.Tel: (08) 287-0191

FOR SPEED, POWER AND EASE OF USE

FREEZE MACHINE

Now with.. "Single part save" Includes.. "Freeze Frame MkV & Lazer II"

- **Freeze...** Totally unstoppable Freeze facility from the originators.
- **Fast Save...** Saves in as little as 15 seconds. Nothing else can match this
- **Multiple Save...** Make as many saves as you want once frozen, in different styles if you wish.
- **Ultra Compact...** The most efficient compacter? Our tests indicate this, as many as 5-6 games per disk.
- **Game Killer...** Incorporates an effective routine to disable collision detection.
- **Independant...** Even produces stand alone Lazer files that reload in as little as 10 seconds.
- **Ease of use...** Always a strong feature, now even more enhanced.
- **Multi-Load...** Standard cartridge handles many games of this type. With the utility disk even more!
- **Fast Format...** Formats your disks in about 12 seconds.
- **File Copier...** Built in fast copier handles files up to 248 blocks long and is really easy to use.
- **Two Fastloads...** A normal disk turbo at 5-7 times normal PLUS the astonishing Lazer at 20+ times normal...BUILT IN.
- **Selectaload...** Just use cursors to scroll to the program you want and press a function key.
- **Reset...** Built in, so you can enter pokes for more lives etc.
- **Tape Turbo...** For quick save/reload on tape.

CHILLS THE REST!

"...far outstrips the opposition on both price and performance ..." Commodore Review

"...the most exciting and lightning fast I have ever used..." Commodore Computing International

Why Freeze Machine?

This is the latest and most effective backup cartridge from Evesham Micros, the originators. It's speed of operation is the staggering feature. Imagine being able to SAVE & reLOAD your favourite games in as little as 10 seconds and no more than 18. No other "device" can remotely match these figures...remember these facilities are *built in*. Buy the "Freeze Machine" and see it perform, if you don't agree that it is the most formidable cartridge available return it within your statutory 28 days for full refund, we are that confident.

ONLY **£28.95**

UPGRADES

MkI, II, III, IIIB....	£19.95
MKIV.....	£ 7.95
Lazer.....	£ 2.00

FREEZE MACHINE Strikes Back

Freeze Machine Utility Disk V3.0

Latest version of the disk that complements the use of the Freeze Machine. Includes well over 30 routines. Allows the complete transfer to disk of many programs that load extra parts as the game progresses (the ones the standard cartridge cannot handle). Includes many of the latest popular titles like Last Ninja & Gunship plus many "standards" like World Games & Supercycle. A very useful add-on to your Freeze Machine.

Upgrades: £2.00

ONLY £7.95

QUICKDISC+ Disc Disector V5.0 DOUBLER

Our highly popular fast load/save plus utility cartridge has received many favourable reviews.

- FAST LOAD (5-7 times faster)
- FAST SAVE (5-7 times faster)
- FAST FILE COPY (up to 248 blocks)
- RESET BUTTON (unstoppable)
- DRIVES CENTRONICS PRINTER
- FAST FORMAT
- FAST DISK BACKUP
- EASY DOS COMMANDS
- HELP MENU
- 128 COMPATIBLE ('64 mode)

only **£19.95**

Our well established and extremely popular disk backup/utility package. The powerful nibblers can produce backups of **most protected software.** Also includes many parameters for difficult to copy software. This latest version will handle many titles by Hewson, Ocean, Domark & U.S. Gold that rival products can not. **Beware** of American & German copy programs that will not handle the popular British titles.

INCLUDES THE FOLLOWING

- EVESHAM 3 MINUTE NIBBLER
- EVESHAM 8 MINUTE NIBBLER
- MANY PARAMETERS (the vital code for the protection schemes)
- DUAL DRIVE NIBBLER
- MENU MAKER
- DISK ORDERLY
- DISK RESCUE
- UNSCRATCH
- DISCMON+
- ETC., ETC.

only **£19.95**

The whole package is easy to use and menu driven. Works with '128 in '64 mode and most routines 1570/1 compatible. Perfect operation with Excelerator+.

THE Tape Backup "device"

Many thousands of this popular product have been sold and still sales flourish. **Why?** We think because it is the best product of it's type. It consists of hardware and software and uses a unique method, controlled by the software, that will allow you to make a perfect backups of your tape software.

- EASY TO USE
- VERY SUCCESSFUL
- USES TWO CBM TYPE DATA RECORDERS

only **£12.95**

1541 Quiet Stops

Cures the dreaded 1541 drive "hammering"!!

- EASY TO FIT
- DETAILED INSTRUCTIONS
- ONE KIT DOES TWO DRIVES
- HELPS PREVENT ALIGNMENT PROBLEMS

Not suitable for "turn lever" type drives

only **£4.95**

1541 Physical Exam

Does your 1541 suffer from...

ALIGNMENT PROBLEMS

If so you need this package. Contains digital alignment disk and drive fault diagnosis software that allows you to both check **and correct** head alignment & speed.

- CHECKS ALIGNMENT
- CHECKS SPEED
- CHECKS BELT & CLAMPING
- DETAILED INSTRUCTIONS
- INCLUDES QUIET STOPS

only **£39.95**

Evesham Micros

All prices INCLUDE VAT/delivery. Next day delivery £5.00 extra

How to order

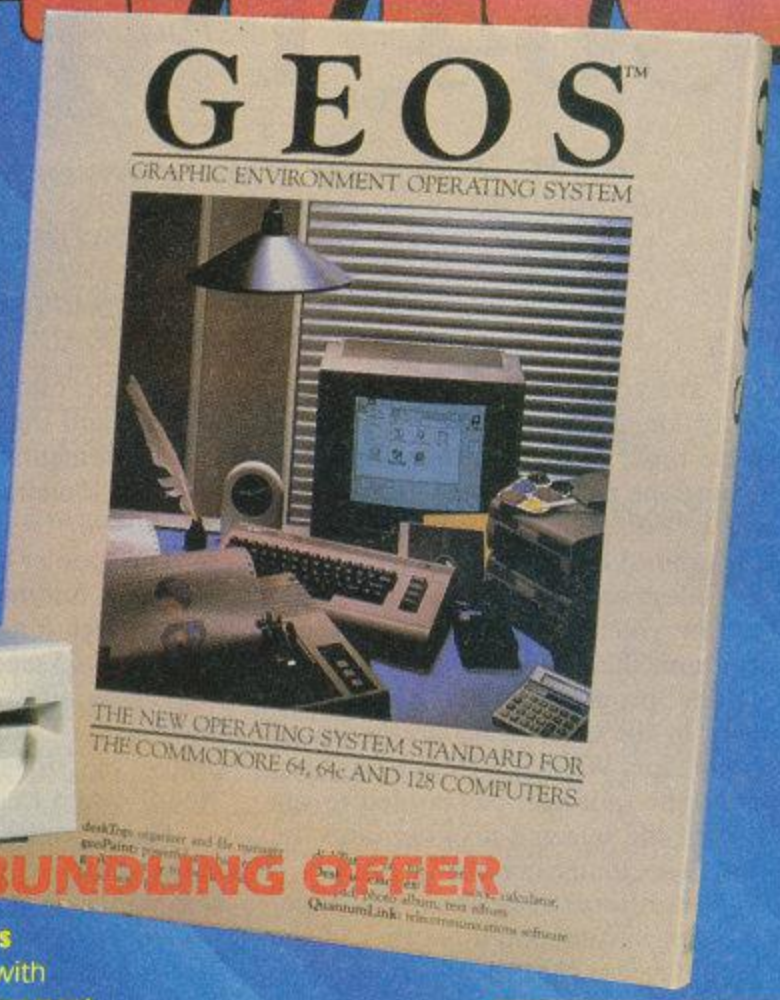
Send cheque/P.O. or Access/Visa details
By phone with Access/Visa no.
Government, educational & PLC orders welcome
Same day despatch whenever possible
Callers welcome, open 6 days 9.30-5.30
TELEX: 333294 EMICRO

Evesham Micros
63 Bridge Street
Evesham
Worcs. WR11 4SF
TEL: (0386) 41989
TELEX: 333294 EMICRO

Also at; 1756 Pershore Rd., Cotteridge, Birmingham B30 3BH Tel; 021 458 4564

DYNAMIC DUO

We guarantee that this drive is MORE compatible than the 1541C



A SUPERB BUNDLING OFFER

A superb bundling offer that combines the critically acclaimed Excelerator+ with the super sophisticated **GEOS** (**G**raphic **E**nvironment **O**perating **S**ystem). **GEOS** is the GEM-like operating system for the 64/128 from which you can access **geoPAINT**, a full-featured graphic workshop, **geoWRITE**, an easy-to-use WYSIWYG word processor and the **Desk Accessories** which include Calculator, Notepad, Alarm, etc. Many more extensions are available, such as **geoCALC, geoDEX,** etc.

This package formerly retailed for **£49.95** but you can obtain it absolutely **FREE** with the purchase of an Excelerator+.

Features . . .

- **E**xtremely compatible
- **X**cellent value
- **C**ompact size
- **L**ow noise
- **E**xternal 8/9 switch
- **R**ave reviews
- **A**ttractive appearance
- **T**urbos, no problem
- **O**ne year guarantee
- **R**uns cool
- +Direct drive motor

". . . my only complaint was that the label on the front of the drive was put on crooked! . . ."
RUN 64

". . . The Excelerator behaved admirably throughout. It does exactly what the 1541 does . . ."
Commodore User

". . . the drive does have dramatic improvements over the 1541 in quality and reliability . . ."
COMPUTE!'s Gazette

". . . I'd rather buy an Excelerator+ than a 1541C or a 1570 or a 1571 . . ."
ZZAP 64

". . . I wish the Excelerator had come out two years ago . . ."
Commodore Computing International

". . . The Excelerator+, though, seems to cope faultlessly with commercial software . . ."
Popular Computing Weekly

Excelerator+ and GEOS £159.95

Excelerator+ and GEOS, *PLUS* Freeze Machine £179.95

Further GEOS Applications

Geofile	£24.95
Geocalc	£24.95
Geodex/Deskpack	£21.95
Writer's Workshop	£21.95
Fontpack 1	£16.95
Geospell	£16.95

ENHANCE YOUR GEOS

Available from good computer stores or direct from Evesham Micros

Prices include VAT. Delivery FREE.
Send cheque/P.O. or ACCESS/VISA details
Or phone with your ACCESS/VISA No.
Same day despatch whenever possible.
Govt., educational & PLC orders accepted.
Callers welcome, open 6 days 9.30-5.30.
Next day delivery **£5.00** extra.

Evesham Micros
63 Bridge Street
Evesham
Worcs. WR11 4SF
Tel: (0386) 765500
Telex: 333294
Fax: (0386) 765354

Access VISA

Evesham Micros

C64 Tape System

Provide a menu driven access to multi-program library tapes with this handy program.

By Richard Kyme-Wright

Have you ever put more than one utility or backup program onto a single tape? Have you then forgotten to note the tape counter setting at the start of the second program and had to fish around on tape looking for it?

Unless you are one of the chosen few, or you rigidly use one tape per program, this utility is for you.

The program offers a selection menu of the titles of programs stored on the tape. When a selection has been made, the tape will be spooled to the start of the selected program and the LOAD sequence commenced.

The difference between this tape-accessing system and any other I have encountered is that there is no need to REWIND the tape to the beginning for a fresh look at the menu. This menu occurs between the programs so that it is ready to use at any time.

Tape Layout

When you have loaded a program the tape stops at the end of that program and before the start of the next. This is the perfect spot to find a menu. From this menu, any other point on the tape can be reached by spooling fast forwards or using rewind. A menu is also placed at the start of the tape to act as a 'registration' point that you can easily find if you do manage to get lost.

Limitations

The C64 tape system is only effective when a tape is being used as a library for your routine, programs and utilities. These programs must all be set up on the tape before the tape system is added. To change the content of the tape or to update a program involving a change in its length would corrupt the layout on the tape and a new tape would have to be set up.

The system can accommodate as many programs as the tape can hold. During the setting up, however, the more programs you have assembled onto a tape the greater the number of spool-time intervals to be measured will be, and the necessary increase in data statements will make the menu program longer in size and take longer to load.

The spooler has been compacted to occupy a minimum number of bytes (2444 bytes for the six title version.) This takes 65 seconds to load normally but can be cut to as little as ten seconds when using a turbo-save program or utility cartridge. (Ten seconds to "load" when I use Final Cartridge II.)

The spooler will close off by instigating the normal loading commands of the C64 when the tape has been spooled to the correct position. The method of calling the next program can be tailored to meet individual program requirements. See Figure 1 for details of this.

Setting up the tape

Type in and "save" the two programs listed here. Note that these are two separate programs and not two parts of the same one.

Place a good quality audio cassette in your 2N cassette unit and reset the counter to 000. Use fast forward to advance the tape past the leader strip; give yourself some spare tape at the start so stop it at a counter reading of, say, "030". There should be enough tape spooled to save the "timer" or "spooler" programs at the start of the tape and not run past this point. At "030" save the first program in your library. Note the counter value at the end of the "save" then use "play" to move the tape forward for "70" seconds to leave a space to save the spooler later.

Use an appropriate shorter time interval if you are utilising a fast-save utility. The tape is now at the start point for the next library program. Build up your tape in this manner until you have the required number of programs on the tape, and leave enough room at the end of the tape for a final spooler program.

Now I recommend that you rewind the tape, reset the counter and load each program in turn. Check that the programs load alright and that the counter values agree with your notes. Note that the true start point for each program will be 70 seconds (or less) beyond the end of the previous program and not at the point where your C64 announces to you that it has found something.

You now have all the information you need to measure the time it takes the cassette drive to spool between any two of the start settings.

Running the timer program

The TIMER program has to be saved at the very start of the tape. Instructions on its operation are displayed as you go along. Proceed as directed and make the necessary notes on the spooling times chart. Remember, read the tape counter while the tape is being spooled, press space bar as it approaches the required value as the tape will overrun slightly when switched off. This will take a little practice to get right.

Use the chart layout as suggested in Figure 2 to avoid getting lost between the different programs on the tape. Record the timer values obtained from a rewind as negative values and those from fast forward as positive values. Note that the last line of the chart is set with all negative values. This records the rewinding time to reach the start point of each program from the forward end of the tape. This point is 70 seconds of 'play' time (or less) beyond the end of the last program. Make a record and refer to Figures 2 and 2.1 for more details.

Setting up the spooler program on the tape

When your chart is complete LOAD the spooler program (do not RUN it as it will reset itself with NEW when it finishes). List out line 16 and replace

the text found within the quotation marks with the general title for this tape. (Overtype the text then press RETURN). Do not use the INSERT or DELETE key as the layout of the screen would be corrupted.

Overtype the text in the data statements beginning at line 74 with your program titles in their order on the tape. This is the point where you can tailor the spooler program to the actual contents of your tape.

If the number of titles is six or less use lines 74 to 80 as given in the listing. Type in all six titles or, if less than six, put in spaces of text on the unused data lines. Select the appropriate method of loading each program from the chart in Figure 1, and put the relevant code into each title line after the coma. Take the first line of numbers from your chart of spool times and type them over the "+0000"s in line 80.

Your data lines should look like this for four titles:

```
74 DATA" 1: PROGRAM TITLE
ONE ",1
75 DATA" 2: TITLE OF PROGRAM
TWO ",2
76 DATE" 3: HERE IS PROGRAM
THREE ",2
77 DATE" 4: PROGRAM FOUR ",1
78 DATA"                  ",0
79 DATA"                  ",0
80 DATA+0000,+0540,+0732,+13
55,+0000,+0000
```

or this for six titles:

```
74 DATA" 1 PROGRAM TITLE
ONE                       ",1
75 DATA" 2 TITLE OF PROGRAM
TWO                       ",2
76 DATA" 3: HERE IS PROGRAM
THREE                     ",2
77 DATA" 4: PROGRAM FOUR",1
78 DATA" 5: THE FIFTH
PROGRAM                   ",3
79 DATA" 6: PROGRAM NUMBER
SIX                       ",1
80 DATA +0000,+0540,+0732,+13
55,+1760,+2321
```

If more than six titles are required use line 79 (item six) for the NEXT SELECTION option and set the code at the end of the line to '8'. (This triggers the program to the next page of titles.)

Retype the data lines as in lines 74 to 80 starting with the new line number of 81.

Item six must again be the NEXT SELECTION option and if this is the last page, set the code at the end of the line to '9'. This makes the display revert to the initial selection.

```
74 DATA" 1: SOUND CREATOR                ",2
75 DATA" 2: SOUND MAKER                  ",3
76 DATA" 3: SOUND SEQUENCER              ",2
77 DATA" 4: MUSIC THEMES ALBUM           ",1
78 DATA" 5: MUSIC HITS,ALBUM             ",1
79 DATA" 6: ----------▼ NEXT LIST ▼",8
80 DATA-7650,+0000,+0100,+1630,+2410,+0000
81 DATA" 1: MELODY TIME, POP HITS        ",1
82 DATA" 2: SYNC. SYNTH. CLASSICS        ",1
83 DATA" 3: TUNES FOR YESTERDAY          ",2
84 DATA" 4: TUNES FOR TOMMOROW           ",2
85 DATA" 5: TUNES FOR TODAY              ",2
86 DATA" 6: ----------▼ NEXT LIST ▼",9
87 DATA+3170,+3920,+4670,+5210,+5880,+0000
```

In the second example I have gone a stage further and used eleven titles spread over three pages!

```
74 DATA" 1: SOUND CREATOR                ",2
75 DATA" 2: SOUND MAKER                  ",3
76 DATA" 3: SOUND SEQUENCER              ",2
77 DATA"NOTE ABOUT HARDWARE PUT HERE!!",0
78 DATA"==============================",0
79 DATA" 6: ----------▼ NEXT LIST ▼",8
80 DATA +0100,-0765,+0000,+0000,+0000,+0000
81 DATA" 1: MUSIC THEMES, ALBUM          ",1
82 DATA" 2: MUSIC HITS, ALBUM            ",1
83 DATA" 3: MELODY TIME, POP HITS        ",1
84 DATA" 4: SYNC. SYNTH. CLASSICS        ",1
85 DATA"==============================",0
86 DATA" 6: ----------▼ NEXT LIST ▼",9
87 DATA+1630,+2410,+3170,+3920,+0000,+0000
88 DATA" 1: TUNES FOR YESTERDAY          ",2
89 DATA" 2: TUNES FOR TODAY              ",2
90 DATA" 3: TUNES FOR TOMMOROW           ",2
91 DATA" 4: TUNES THAT NEVER WERE ...  ",2
92 DATA"==============================",0
93 DATA" 6: ----------▼ NEXT LIST ▼",9
94 DATA+4670,+5210,+3170,-1870,+0000,+0000
```

Figure 2: chart layout for recording Timer values

Figure 1: the options available to the spooler when it hands over to the LOAD sequence.

CODE	LINE	Produces the following response	
1	60	Hold down Shiftkey and press RUN/STOP 'READY'	(use to create an AUTORUN command when loading BASIC)
2	61	LOAD"",1,1 < return > 'PRESS PLAY ON TAPE'	(normal LOAD command)
3	62	LOAD"",7 < return > 'PRESS PLAY ON TAPE'	(for use with programs saved using the 'freeze' or 'turbo' facilities of Final Cartridge II)
4	63		
5	64		
6	65		
7	66		

Space is available in lines 63 to 66 to define any other load variations you require.

Of course, if your list of titles continues, lines 81 to 87 will be full and the block of lines 74 to 80 can then be repeated again on new lines 88 to 94.

Here are two examples adapted from one of my own applications. In the first there are ten titles on the menu and option six on each 'page' is used to turn to the list on the next 'page' (or to go back to the first 'page').

In this second example I have gone a stage further and used eleven titles spread over three 'pages'.

It is important to note the timer values are not in sequence in lines 80, 87 and 94 as the titles have been grouped by subject and not by the position on the tape. Each timer value must correspond to the program title in the list that owns it. (Type in these data lines and run the program to see how it handles them. Change the NEW command in line 73 to a STOP command first or your experiment will involve a lot of re-LOADS.)

With the data lines set up, save the spooler program using the fast-save facility (if you have one) at the appropriate position before the start point of the first program. Next spool forwards to the end of that program, using the tape counter and your notes for guidance.

List spooler to your screen then overtype the timer values (lines 80, 87 etc.) with the second set of figures from your timing chart then SAVE spooler at the tape position you have now reached.

Continue this process until spooler has been saved between each program on the tape and once more after the last program using timer values that are all -ve.

Begin with the tape positioned at the start of one of the programs by setting the tape to the tape counter value noted for that program on the left of this chart; spool to the start point of a program listed along the top, and record the timer value displayed by the spool timer program in the appropriate box on the chart. See Figure 2.1 for an example.

This chart can be expanded to accommodate any number of programs as long as there is one column per program and one line more than the number of columns.

Figure 2.1: This is an example of the chart when partly filled in. The top and left side of the form is used for noting down tape counter values for the start point of each program present.
E.g. (In this example)

The next spool time to be measured is the one between the start of program four back to the start of program two.

The tape counter should show the number "100". Press the rewind key and then the space bar. Press the space bar again when the counter runs back past "57" to allow the tape to come to rest at "55". Note down the timer value in the box marked "????". (I get a timer value of "0390" for this one.)

Figure 2

PROGRAM NUMBERS	1	2	3	4	5	6		
1	+0000	+	+	+	+	+		
2	-	+0000	+	+	+	+		
3	-	-	+0000	+	+	+		
4	-	-	-	+0000	+	+		
5	-	-	-	-	+0000	+		
6	-	-	-	-	-	+0000		
7	-	-	-	-	-	-		

TIMER VALUES

Figure 2-1

PROGRAM NUMBERS		1 030	2 055	3 075	4 100	5 120	6 135	7 150	8 170
1	030	+0000	+0350	+0664	+1040	+	+	+	+
2	055	-0190	+0000	+0290	+	+	+	+	+
3	075								
3	075	-0350	-0150	+0000	+0360	+0660	+	+	+
4	100	-	-????	-0220	+0000	+0275	+0510	+	+
5	120	-	-	-0400	-0170	+0000	+220	+0450	+
6	135	-	-	-	-0345	-0318	+0000	+0270	+0520
7	150	-	-	-	-	-0310	-0160	+0000	+0280
8	170	-	-	-	-	-	-0390	-0215	+0000
9	200	-	-	-	-	-	-	-	-0350

Timer – Process Description

Line	Description of process
100	Set up background and border colours
110-210	Paint screen layout
220	Deposit character on last position of screen
230-300	Display instructions on the screen, reset the keyb'd register
310	Read keyboard character
320	If character=f1..... (EXIT)
330	If cassette 'STOP' key has been used....
340	If character < > space bar....
350-430	Paint timer box on screen
440	Set up timer reference, start spooling the tape
450	Calculate elapsed time
460-570	Display elapsed time, LOOP until space bar is pressed
580	Stop spooling the tape
590	Display prompt "PRESS RETURN TO RESET 'TIMER'"
600-630	Read keyboard character, respond to "RETURN KEY" and "f1"
640-650	Display prompt "READY FOR NEXT" and reset timer display
660-690	Read keyboard character, respond to "f1", "STOP", "SPACE BAR"
700	Reset timer value and go to line 450 (LOOP)
710	BUZZ and FLICKER error procedure
720-750	Display the error message
760	Exit from the program – END

The Best of 1987

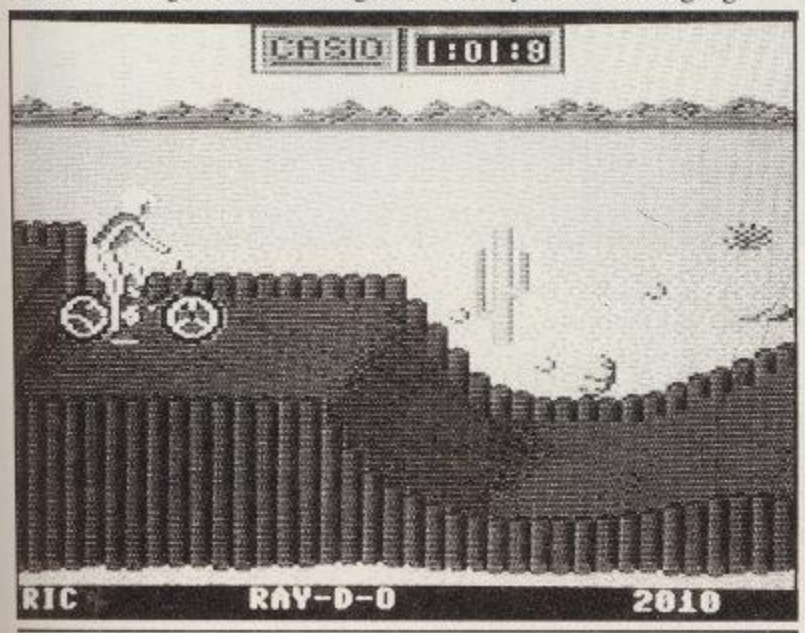
Whether you are looking for a present to buy or want to treat yourself, you'll find something in our list of favourites from 1987.

By Tony Hetherington

It's been a great year for games with more American giants setting up shop on these shores. Soon you won't have to wait for the latest game from Electronic Arts, Microprose, Origins or Infocom as they'll be released simultaneously here and in the States.

This top ten has been compiled by the marks given by the reviewers of each game of the month. For a full review check the relevant copy or contact our back issues department.

California Games/EPYX/US Gold/£9.99 cass/£12.95 disk.
The fifth and finest of the *games* games that started in Summer, passed through Winter and then went around the World. Now California games takes you through six sun soaked sports that feature skateboarding, foot bagging, surfing, roller skating, BMX racing and finally frisbee flinging.



Sentinel/Firebird/£9.95.
A battle of skill and strategy pits you against the energy absorbing Sentinel across a staggering 10,000 landscapes. Your aim is to get to the highest peak and absorb the Sentinel before it gets you.

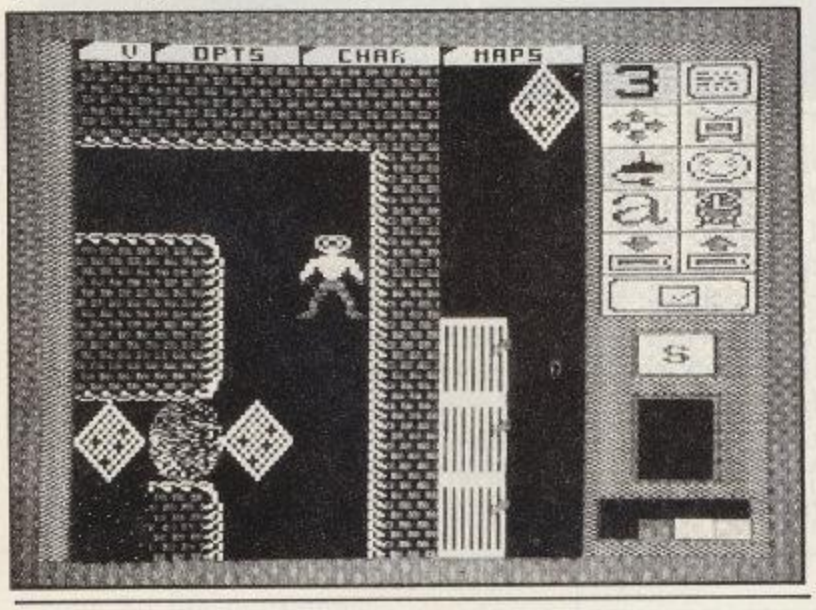
The Last Ninja/System 3/£9.29.
In what must be the last word in marshal arts games you have to punch, kick and kill an increasing variety of opponents with a growing arsenal of weapons that are strewn about the glorious graphic landscapes. If you're into combat games that get the Last Ninja; it beats the opposition.

Druid/Firebird/£7.95.
Druid was the best of the Gauntlet clones as it added the use of spells to top down scrolling adventuring. Our hero has to battle with ghosts, beetles and demons to reach chests that contain magic spells and pentagrams that replaced lost energy. When you opened a chest you were faced with a dilemma of which of the powerful spells you should choose. Should you collect more fire, water or electrical attack spells, grab a key or even the Golem, a faithful servant, that could be played by a second player? If you haven't got a copy of Druid yet, then there's no dilemma, buy one.

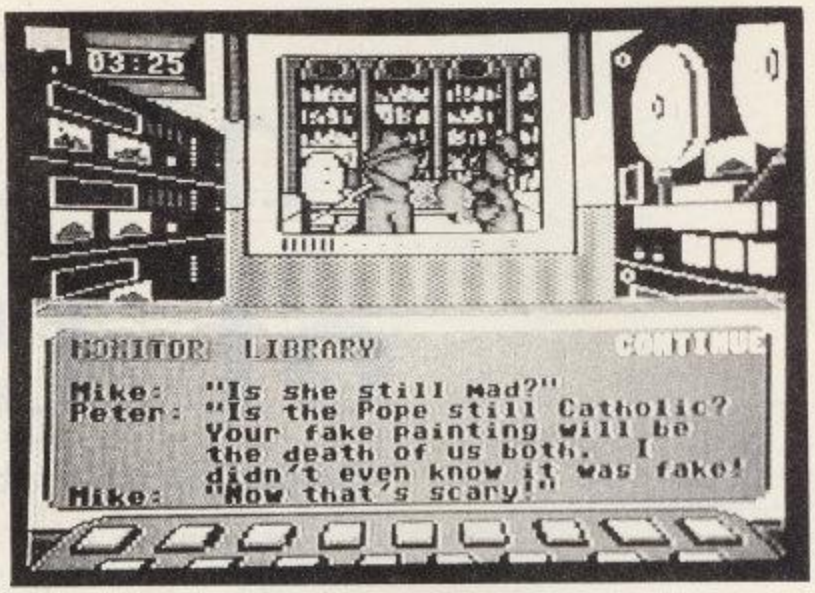
Gunship/Microprose/£14.95 cass/19.95 disk.
Gunship took flight simulators to new heights with a combination of an easy to fly helicopter that bristled with weaponry and an addictive gameplay that included flying over 100 missions throughout the warzones of the world. If you succeeded in wiping out enemy command posts, tanks, helicopters, gun emplacements and infantry you could gain promotions and medals and progress to more daring missions.

Stifflip and Co./Palace/£9.99 cass/£12.99 disk.
Stifflip and Co. brought good eggs, cucumber sandwiches and stiff upper lips to the wicket of adventures as four all round heros set off to a South American banana republic to stop some bounder destroying the world. You'll have to keep a straight bat and wits sharpened if you're to survive the onslaught from Generals and other jungle types. Some of these can be solved with fisticuffs, others will need the old thinking cap.

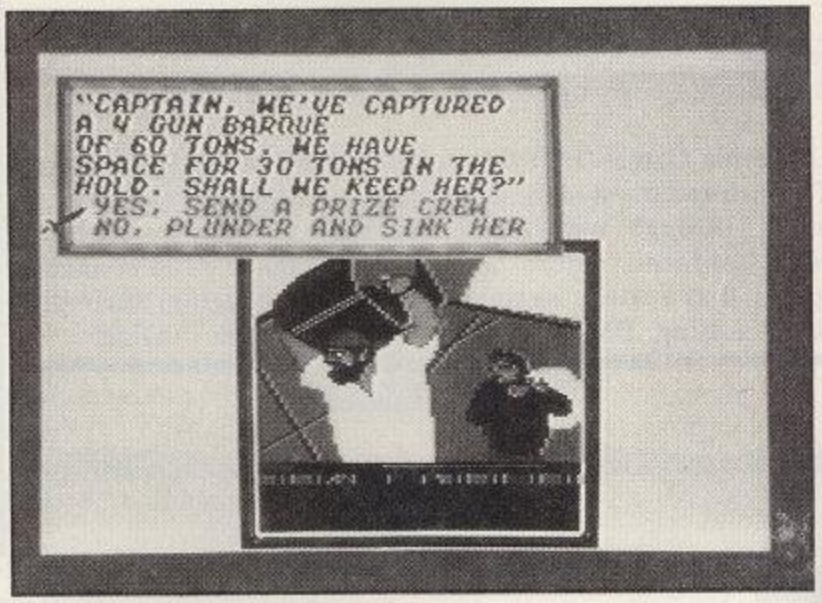
Repton 3/Superior/£9.95.
A boulderdash style of game in which you must collect diamonds and a golden crown to progress to the next level while avoiding plummeting rocks, hatching monsters and ghastly ghosts. A great game if you can keep your nerve. If you can't, you'll soon be given a crushing blow.



Killed Until Dead/Accolade/US Gold/£9.99.
Murder, mystery and mayhem lie in store as the Midnight murder club has just booked into the hotel where you're the house detective, and they're all out to prove that they're the world's greatest murderer. Luckily, you're the world's greatest detective and with the help of security cameras and less subtle breaking in rooms, you just might solve the 20 cases supplied on the game tape or disk.



Pirates/Microprose/£14.95.
The first ever swashbuckling simulation takes you to the high seas as you take command (fight for command) of a pirate ship. From there you sail the seven seas in search of treasures to plunder and forts to attack. You can opt to be an all out pirate and steal from any ship or instead become a privateer and serve King and country which means you plunder ships from the rest of the world. A superb simulation that's easy to get into despite the daunting task of a 90 page instruction manual!



Gauntlet/US Gold/£9.99.
The pick of the coin-op conversions that gives you 512 dungeon levels to explore as you battle with ghosts, grunts, lobbers and sorcerers. This excellent game is now just part of US Gold's Solid Gold compilation which is this month's game of the month.

FOUR FEATURED ADD-ONS.

Are you happy with your computer system or do you want to stretch it a little further? If so, here are four add-ons that *Your Commodore* has featured in the last year.

Accelerator +/Evesham Micros/£159.95.
Evesham Micros produced an alternative to the large and lumbering Commodore 1541 disk drive. The Accelerator + is smaller and slimmer, compatible with nearly all disk software, claims to be up to 25% faster and costs £40 less!
Teletext Adaptor/Microtext/£69.95.
Teletext is the information service that's broadcast alongside BBC and ITV programs. Until now you had to buy a

specially adaptored TV to receive this information but thanks to the Microtext teletext adaptor you can use your C64. You can not only read the pages of news, results, reports and TV listings but also use the information in your own programs thanks to a screen reading utility.

LOAD-IT/Load-It/£19.95.

Available either ready fitted or as a kit for £10 less this little device could save you hours of anguish as you watch tapes not loading. By simply turning a graduated switch you can adjust the angle of the read head in your datasette and load in nearly all those programs that you thought were unloadable.

Eprommer 64/Datel/Electronics/£39.99.

Together with Datel's Cartridge Development system (£12.99) you can now create your own cartridges by down loading your programs onto an Eprom and then building it into a cartridge. Push your new cartridge into the C64, turn on and there's your program ready to use. With full, easy to follow instructions you can't afford to ignore Eprom programming.

BUSINESS AND UTILITIES

More and more people are using their computers for more "serious" applications either for word processing, storing information or devising amazing graphics. Here are ten programs that we have featured in the *Your Commodore* that will put your C64 to work.

Mini Office II/Database/£14.95 cass £19.95 disk.

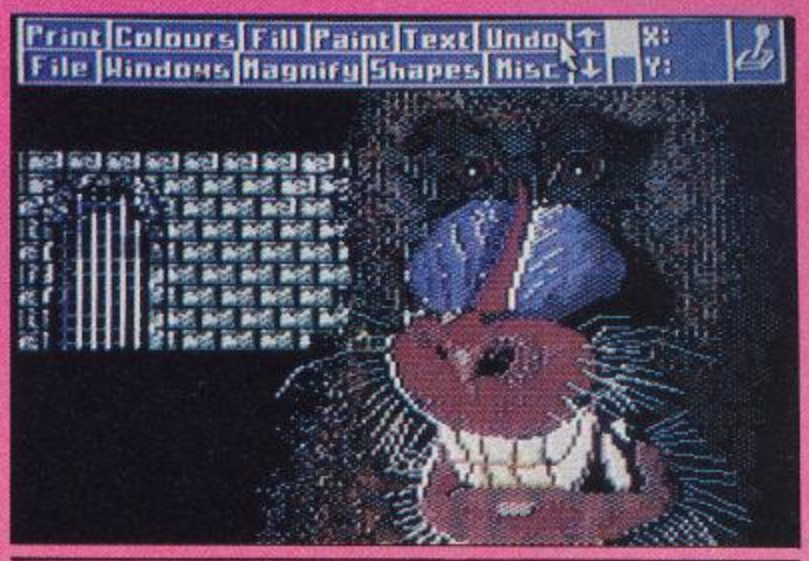
Mini Office II is a package that represents excellent value for money as it includes a word processor, database, spreadsheet, graphing utility, comms pack and label printer all for the price of one. The menu controlled package is easy to use, fully compatible and a must for all users.

Stop Press/AMX Software/£39.95.

Available on its own or with the AMX mouse for £69.95, Stop Press is a flexible desktop publishing program that can take text from any PET ASCII file and then print it in a variety of fonts and combine it with a library of clip art. The results can then be printed out to form a newsletter or saved for later use.

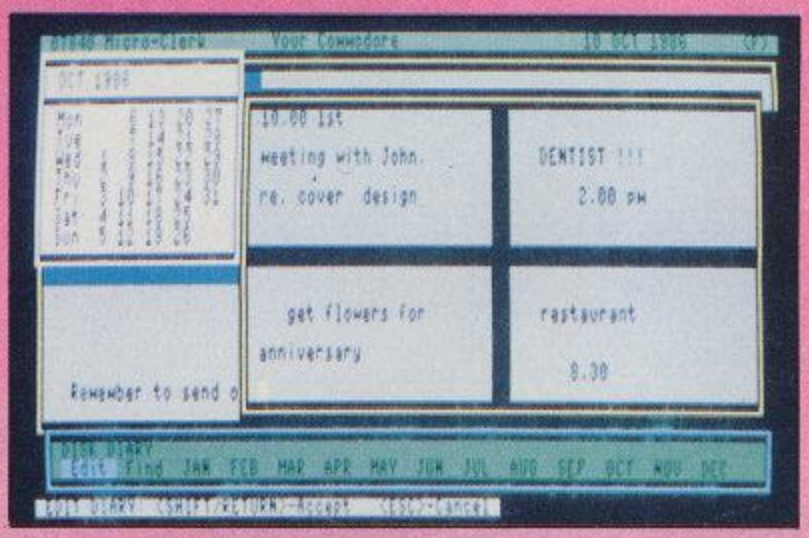
Advanced Art Studio/Rainbird/£24.95 (disk).

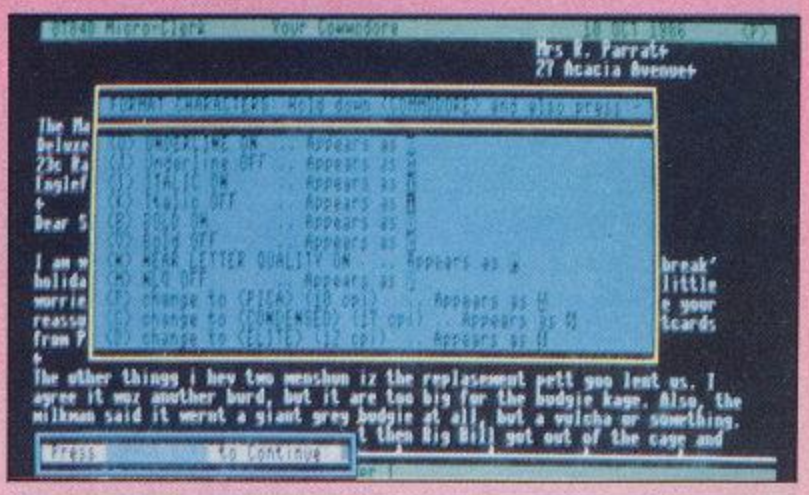
The Advanced Art Studio is the first of two graphics packages featured in this roundup. Based on the original window and pull down menus of the Art Studio, it includes added features such as support for multi colour mode, user defined brushes that can include four colours and can be 12x16pixels big and load, and save and sized window of the screen as easy to build up picture elements.



Micro Clerk/JCL/£99.99.

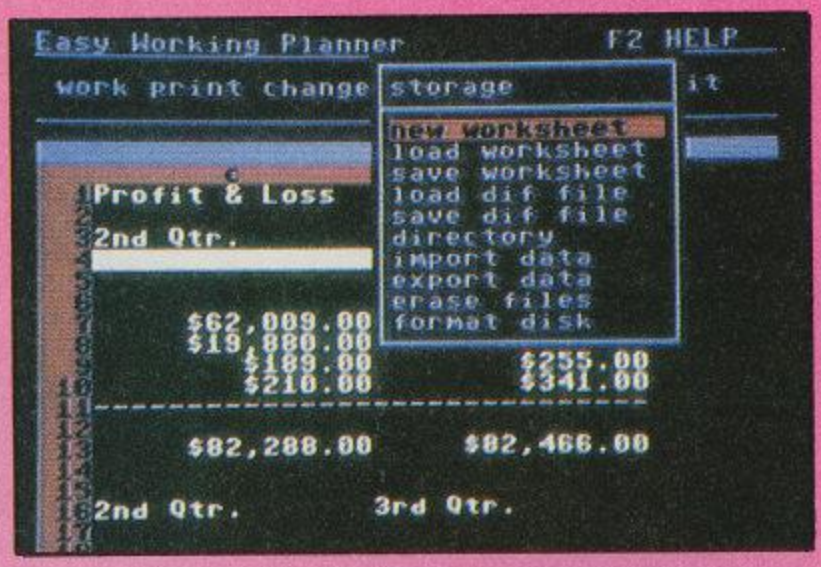
A combined business package for the C128 puts this machine to work and turns it into an essential workhorse for all small businesses. The package not only contains a word processor, spreadsheet, cash book and database but also can be expanded through extension packages that include a sales ledger, purchase ledger and payroll.



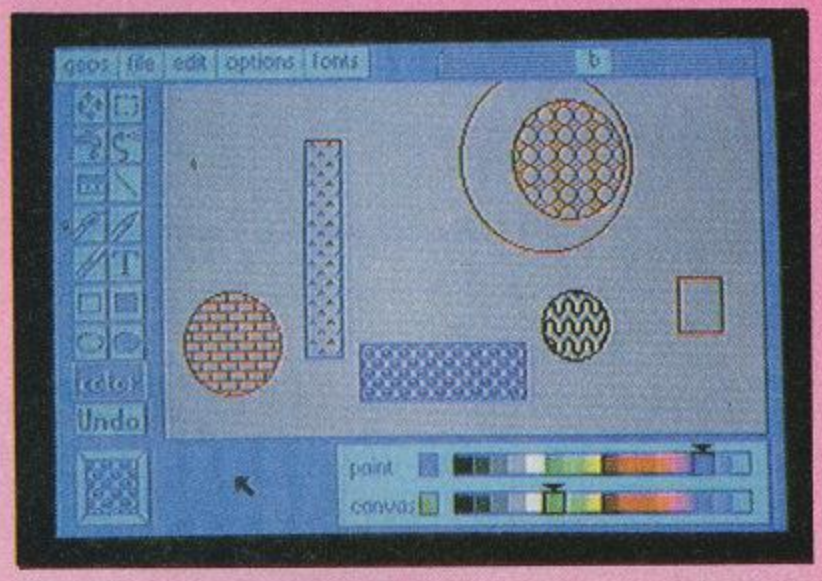


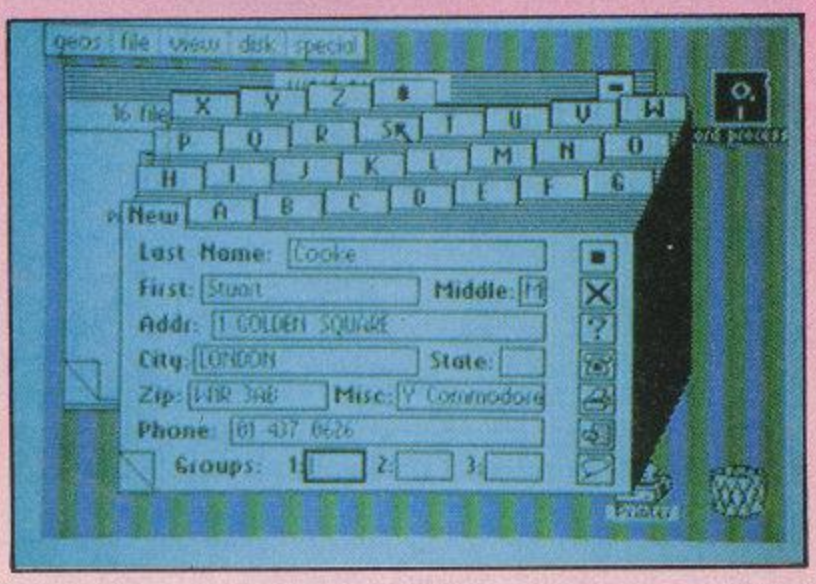
Logotron 1295/Logotron/£12.95 each.

A trio of packages that have been tailor made for the British market from the American Spinaker originals. Planner 1295 is a particularly comprehensive spreadsheet program and is matched by Writer 1295, and Filer 1295, both for ease of use and value for money. Could this trio become the Lotus 1-2-3 of the C64 world?



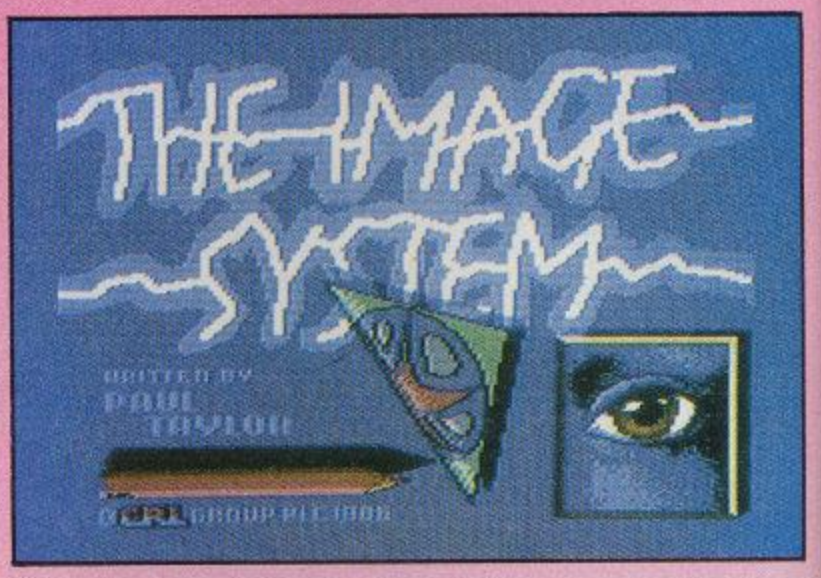
Geos Extensions/Berkley Softworks/Microprose UK/£29.95.
GEOS, the Graphic Environment Operating System, disk operating system first brought windows and icons to the C64 earlier this year. Now through a new importer the cost has come down and the original system has now been joined by Writers Workshop, Geofile, GeoCalc and more fonts and desktop utilities including a graphics grabber that can take Newsroom and Print Shop graphics.





Video Title Shop/US Gold/£14.99.
A graphics package and a screen animator combine to form a package that can be used for anything from a title page for the video of Fred's birthday to a full advertising demo. The text and graphics are created on screen where they can be animated in a variety of ways and stored either on disk or recorded onto a video.

The Image System/CRL/£24.95.
Described as one of the best graphic programs available for the C64 the image system uses the now standard method of joystick control and has a variety of menus from which you can draw, fill and colour shapes, as well as the unusual image menu that not only allows you to save, magnify and print parts of the screen but also distort and twist the shape into any other.



Blinker-64/Information Development Systems/£29.90.
Blinker-64 is an invaluable utility for Basic programmers and allows you to write programs using existing subroutines that you have already written, tested and debugged on disk. When you've completed the program, Blinker-64 pulls in the routines and renumbers the program and presents a full on screen report including the start and end addresses and the number of modules used.

The Toy Shop/Precision Software/£39.08.
20 working toy models that can be printed out and then built are included on one disk, along with full instruction manual and sundry extra componets such as small pieces of dowel, rubber stripping and balloons. This may sound a bit like Blue Peter and a bit pointless but it is actually great fun. This could send the paper aeroplane industry to new heights. YC

Listings

Get it right first time with our deluxe program system for the C64.

You may have noticed that our listings are free of those horrible little black blobs which send you searching around the keyboard for a suitable graphic symbol. You may also have noticed the funny numbers by the side of each line of the listing. Fret no more, it's all part of our easy entry aid.

Instead of those nasty graphics and rows of countless spaces in PRINT statements and strings we use a special coding system. The code, or mnemonic, is always contained in square brackets and you'll soon learn to decipher their meanings.

For example, [SA] would mean type in a Shifted A, or an ace of spades in layman's terms, and [SA10] would mean a row of ten of these symbols.

[S+2] means hold down the shift key and press the plus key twice. It doesn't take a great leap of logic to realise that [C+2] means exactly the same thing except that the Commodore key (bottom left of the keyboard) is held down instead of the shift key.

If more than two spaces appear in a statement then this will be printed as [SPC4] or, exceptionally, [SSPC4]. Translated into English this means press the spacebar four times or in the latter case hold the shift key down while you do it.

A string of special characters could appear as:

[CTRL N, DOWN2,LEFT5,BLUE, F3,C3]

This would be achieved by holding down the CTRL key as you press N, press the cursor key down twice, the cursor left key five times, press the key marked BLUE while holding down the CTRL key, press the F3 key and, finally hold the Commodore key down while pressing the number two key (C2 would of course make the computer print in brown).

Always remember that you should only have a row of graphics characters on your screen with no square brackets and no commas, unless something like this appears:

[SS],[C*]

In this case the two characters should have a comma between them.

On rare occasions [REV T] will appear in a listing. This is a delete symbol and is created by entering the line up to this mnemonic. Then type a closing quotation mark (SHIFT & 2) and delete it. This gets the computer out of quotes mode. Hold down CTRL and press the number nine key (RVSON), type the relevant number of reversed T's and then hold down CTRL and press zero (RVSOFF). Next type another quotation mark and delete it again. Now finish the line and press RETURN.

A list of these special cases is given in the table but remember that only one of these mnemonics will appear outside of a PRINT string: the symbol for pi. This may appear when its value is needed in a calculation so this may look something like:

:CC=2*[PI]*R:

Ignore the square brackets and just type in a shifted upward pointing arrow (ie. the pi symbol).

PROGRAM: SYNTAX CHECKER

```
5 REM SYTAX CHECKER - ERIC DOYLE

10 BL=10   :LN=70   :SA=49152
20 FOR L=0 TO BL:CX=0:FOR D=0 TO
 15
30 READ A:IF A>255THENPRINT"NUMB
ER TO LARGE";LN+(L*10):STOP
40 CX=CX+A:POKE SA+L*16+D,A:NEXT
 D
50 READ A:IF A><CX THENPRINT"ERR
OR IN LINE";LN+(L*10):STOP
60 NEXT L:SYS 49152:NEW
70 DATA 173,5,3,201,165,208,31,1
20,169,9,141,32,208,141,33,208,1
847
80 DATA 169,7,141,134,2,169,13,3
2,210,255,169,64,141,4,3,169,168
2
90 DATA 192,141,5,3,88,96,120,16
9,124,141,4,3,169,165,141,5,1566

100 DATA 3,169,14,141,134,2,141,
32,208,169,6,141,33,208,88,96,15
85
110 DATA 32,124,165,72,138,72,15
2,72,162,0,165,20,133,254,165,21
,1747
120 DATA 24,101,254,133,254,189,
0,2,240,18,69,254,133,254,232,18
9,2346
130 DATA 0,2,240,8,24,101,254,13
3,254,232,208,233,169,1,141,134,
2134
140 DATA 2,165,254,74,74,74,74,3
2,156,192,32,210,255,165,254,41,
2054
150 DATA 15,32,156,192,32,210,25
5,169,13,32,210,255,169,13,32,21
0,1995
160 DATA 255,169,7,141,134,2,104
,168,104,170,104,96,24,105,48,20
1,1832
170 DATA 58,16,1,96,24,105,7,96,
0,0,0,0,0,0,0,0,403
```

by Eric Doyle

Checksum Program

The hexadecimal numbers appearing in a column to the left of the listing should not be typed in with the program. These are merely checksum values and are there to help you get each line right. Don't worry if you don't understand the hexadecimal system, as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line checking program.

Type in the Checksum Program, make sure that you've not made any mistakes and save it to tape or disk immediately because it will be used with most of the present and future listings appearing in Your Commodore.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type in a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

If the two values don't relate to one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and press RETURN again.

If you want to turn off the checker simply type SYS49152 and the screen will return to the familiar blue colours. You can then do whatever it was you wanted to do and if this doesn't use the area where Checksum lies you can go back to it with the same SYS command.

Lower Case

Many of the listings are presented in lower case. To turn your computer to lower case mode press the Commodore key and the SHIFT key at the same time. YC

Mnemonic	Symbol	Keypress
[RIGHT]		CRSR left/right
[LEFT]		SHIFT & CRSR left/right
[DOWN]		CRSR up/down
[UP]		SHIFT & CRSR up/down
[F1]		f1 key
[F2]		SHIFT & f1 key
[F3]		f3 key
[F4]		SHIFT & f3 key
[F5]		f5 key
[F6]		SHIFT & f5 key
[F7]		f7 key
[F8]		SHIFT & f7 key
[HOME]		CLR/HOME
[CLR]		SHIFT & CLR/HOME
[RVSON]		CTRL & 9
[RVSOFF]		CTRL & 0

Mnemonic	Symbol	Keypress
[BLACK]		CTRL & 1
[WHITE]		CTRL & 2
[RED]		CTRL & 3
[CYAN]		CTRL & 4
[PURPLE]		CTRL & 5
[GREEN]		CTRL & 6
[BLUE]		CTRL & 7
[YELLOW]		CTRL & 8
[POUND]		£
[LARROW]		←
[UPARROW]		↑
[PI]		SHIFT & ↑
[INST]		SHIFT & INST/DEL
[REV T]		see text
[Cletter]		CBM + letter
[Sletter]		SHIFT + letter

PROGRAM: TIMER

```
76  100 POKE53280,0:POKE53281,0:
    PRINT"[CLR]";
FA  110 PRINT"[C5,SU,S*38,SI]";
50  120 PRINT"[S-,SPC3,GREEN,CA,
    CR,CS,SU,SC,SI,CA,SC,SI,CA,S
    C,CS]  [SU,SC,SI,SU] [SI,SU,
    SC,SI,CA,CR,CS,CA,SC,CS,CA,C
    R,SI,CS,SPC3,S-]";
54  130 PRINT"[SB,SPC3,GREEN] [S
    B,SSPC,CQ,SC,CW,CQ,SC,SK,CQ,
    SC,SPC3,SJ,SC,SI,SJ,CR,SK,SJ
    ,SC,SI] [SB] [CQ,SC] [SB3,CS
    ,SPC3,S-]";
72  140 PRINT"[S-,SPC3,GREEN] [C
    E] [CE] [CE2]  [CZ,SC,CX]  [
    SJ,SC,SK] [CE] [SJ,SC,SK] [C
    E] [CZ,SC,CX,CE] [CE,CS,SPC3
    ,S-]";
AA  150 PRINT"[CQ,S*38,CW]";
ED  160 PRINT"[S-,SPC11,C3]TAPE
    SPOOL-TIMER[C5,SPC11,S-]";
83  170 PRINT"[SJ,S*38,SK]";
0D  180 PRINT"[DOWN14]"
82  190 PRINT"[SU,S*38,SI]";
B2  200 PRINT"[C8,S-]'F1' - EXIT
    [SPC6,GREEN](C)R.KYME-WRIGHT
     1987[C5,S-]";
7B  210 PRINT"[SJ,S*38,UP11]";
57  220 POKE2023,75:POKE56295,12

A2  230 PRINT"[UP6,C1]"
A6  240 PRINT"[SPC4]PRESS THE FF
    WD KEY OR THE REWIND[SPC4]"
DA  250 PRINT"[SPC4]KEY THEN TOU
    CH THE  SPACE-BAR TO[SPC4]"
5F  260 PRINT"[SPC4]START SPOOLI
    NG THE TAPE.[SPC3]PRESS[SPC4
    ]"
F7  270 PRINT"[SPC4]THE SPACE-BA
    R AGAIN TO  STOP THE[SPC4]"
3F  280 PRINT"[SPC4]TAPE WHEN TH
    E NEXT COUNTER VALUE[SPC4]"
B6  290 PRINT"[SPC4]IS REACHED.
     NOTE DOWN THE TIMER[SPC4]"
7E  300 PRINT"[SPC4]VALUE ON YOU
    R CHART.[SPC16]":POKE198,0
78  310 GETA1$:K=ASC(A1$+CHR$(0)
    )
6F  320 IFK=13THENPRINT"[CLR]":
    GOTO760
86  330 IF(PEEK(1))=55THEN710
A1  340 IFK<>32THEN310
10  350 PRINT"[UP14,C5,SPC40]"
D9  360 PRINT"[C5,SPC14]TIMER  V
    ALUE[SPC14,C1]"
3B  370 PRINT"[SPC15,CA,SC8,CS,S
    PC15]";
A3  380 PRINT"[SPC15,SB,SPC8,SB,
    SPC15]";
62  390 PRINT"[SPC15,CZ,SC8,CX,S
    PC15]"
08  400 PRINT"[SPC40]"
06  410 PRINT"[SPC40]"
B7  420 PRINT"[SPC40]";
40  430 PRINT"[UP8,RIGHT25,CYAN]
    ";:POKE198,0
27  440 TX=TI:POKE1,7
E7  450 TY=TI:TZ=TY-TX
82  460 LN=LEN(STR$(TZ)):ONLNGOT
    0470,480,490,500,510,520,530
BB  470 PRINT"[LEFT2]";:GOTO540
AC  480 PRINT"[LEFT3]";:GOTO540
D1  490 PRINT"[LEFT4]";:GOTO540
4E  500 PRINT"[LEFT5]";:GOTO540
17  510 PRINT"[LEFT6]";:GOTO540
83  520 PRINT"[LEFT7]";:GOTO540
32  530 PRINT"[LEFT8]";:GOTO540
BC  540 PRINTTZ;
3D  550 GETA1$:K=ASC(A1$+CHR$(0)
    )
E0  560 IFK=13THENPRINT"[CLR]":
    GOTO760
9D  570 IFK<>32THEN450
58  580 POKE1,39
17  590 PRINT:PRINT"[DOWN3,C1,SP
    C3]PRESS RETURN KEY TO RESET
     THE TIMER":POKE198,0
1B  600 GETA1$:K=ASC(A1$+CHR$(0)
    )
0B  610 IFK=13THEN640
0C  620 IFK=13THENPRINT"[CLR]":
    GOTO760
47  630 GOTO600
00  640 PRINT"[UP,C7,SPC9]READY
    FOR NEXT INTERVAL[SPC7,CYAN]
    ";
4E  650 PRINT"[UP5,RIGHT17,SPC7]
    0[RIGHT]";:POKE198,0
B7  660 GETA1$:K=ASC(A1$+CHR$(0)
    )
A2  670 IFK=13THENPRINT"[CLR]":
    GOTO760
29  680 IF(PEEK(1))=55THEN710
04  690 IFK<>32THEN660
38  700 TX=TI:POKE1,7:GOTO450
5B  710 FORX=0TO104:POKE53270,X:
    POKE54296,15:POKE54296,7:NEX
    T
EE  720 PRINT"[CLR,DOWN,C1]  ERR
    OR - THE CASSETTE UNIT IS NO
     LONGER"
48  730 PRINT"[SPC10]UNDER PROGR
    AM CONTROL."
F2  740 PRINT"[DOWN3,SPC10]PLEAS
    E RELOAD 'TIMER'."
DD  750 PRINT"[DOWN]  (DO NOT US
    E THE CASSETTE 'STOP' KEY.)[
    DOWN3]"
58  760 NEW
```

PROGRAM: SPOOLER

```
9F  10 C=0:POKE53280,C:POKE53281
    ,C:PRINT"[CLR]";:GOTO18
51  11 PRINT"[C5,SU,S*38,SI]";
EE  12 PRINT"[C5,S-,SPC3,CA,CR,C
    S,SU,SC,SI,CA,SC,SI,CA,SC,CS
    ]  [SU,SC,SI,SU] [SI,SU,SC,S
    I,CA,CR,CS,CA,SC,CS,CA,CR,SI
    ,SPC3,S-]";
97  13 PRINT "[S-,SPC4,SB,SSPC,C
    Q,SC,CW,CQ,SC,SK,CQ,CW,SPC3,
    SJ,SC,SI,SJ,CR,SK,SJ,SC,SI]
    [SB] [CQ,CW] [SB,S-,SB,SPC3,
    S-]";
8A  14 PRINT "[S-,SPC4,CE] [CE]
    [CE2]  [CZ,SC,CX]  [SJ,SC,SK
    ] [CE] [SJ,SC,SK] [CE] [CZ,S
    C,CX,CE] [CE,SPC3,S-]";
85  15 PRINT"[S-,C3,C@38,C5,S-]"
    ;
BF  16 PRINT"[S-,C3,RVSON] TYPE
    IN A SUITABLE GENERAL TITLE
    HERE[RVSOFF,C5,S-]";
4D  17 PRINT"[SJ,S*38,SK]":RETUR
    N
5F  18 DIMW$(6),D(6),E(6)
16  19 FORX=1TO6:READW$(X),E(X):
    NEXT:FORX=1TO6:READD(X):NEXT

DE  20 GOSUB11:GOSUB71
42  21 POKE211,1:POKE214,19:SYS5
    8732
FF  22 PRINT:PRINT"[DOWN,C7,SPC1
    0]"
BD  23 PRINT"  SELECT AND TYPE I
    N A PROGRAM NUMBER[SPC3,LEFT
    3]";:POKE198,0
4B  24 GETK$:IFK$=""THEN24
DC  25 K=ASC(K$+CHR$(0))-48:IF(K
    >0)AND(K<7)THEN30
ED  26 PRINT"[LEFT14,C4]PROGRAM
    NUMBER[C7]";:FORX=1TO140:NEX
    T
81  27 PRINT"[LEFT14]PROGRAM NUM
    BER";:FORX=1TO140:NEXT
F2  28 GETK$:IFK$=""THENK$="0"
F3  29 GOTO25
E0  30 IFE(K)=0THEN21
5C  31 PRINT"[HOME,DOWN6]":FORX=
    1TOK:PRINT"[DOWN2]";:NEXT
4E  32 PRINT"[UP,SPC5,YELLOW,C@3
    0]"
1A  33 PRINT"[UP,SPC5,RVSON]";W$
    (K);"[RVSOFF,HOME,DOWN21]"
C5  34 IFE(K)=8THENPRINT"[HOME]"
    ;:GOTO19
F3  35 IFE(K)=9THENRESTORE:PRINT
    "[HOME]";:GOTO19
DF  36 IFD(K)=0THEN43
46  37 IFPEEK(1)=55THEN67
32  38 IFD(K)>0THEN41
84  39 DK=D(K)*-1:PRINT"[UP,C3,S
    PC7,C@8]"
D2  40 PRINT"[C7]ENGAGE [C3,RVSO
    N] REWIND [RVSOFF,C7] THEN P
    RESS THE SPACE BAR[UP]":GOTO
    45
A0  41 DK=D(K):PRINT"[UP,GREEN,S
    PC7,C@7] "
67  42 PRINT"[C7]ENGAGE [GREEN,R
    VSON] F.FWD [RVSOFF,C7] THEN
     PRESS THE SPACE BAR ":GOTO4
    5
65  43 PRINT"[UP,GREEN,SPC15]"
6A  44 PRINT"[C7,SPC4]PRESS THE
    SPACE BAR TO CONTINUE[SPC5]"

56  45 POKE198,0
8E  46 IF(PEEK(1)=55)AND(D(K)<>0
    )THEN67
6C  47 GETA$:IFA$=""THEN46
37  48 A=ASC(A$+CHR$(0))-48:IFA=
    -16THEN51
71  49 IF(A<1)OR(A>6)THEN47
CE  50 K=A:PRINT"[HOME,DOWN8]";:
    GOSUB71:GOTO30
95  51 POKE1,39:IFD(K)=0THEN57
2B  52 PRINT"[UP3,SPC15]":PRINT"
    [C1,SPC9,YELLOW]PLEASE WAIT.
    .......[SPC12]"
3C  53 T=TI+DK:POKE1,7
67  54 IFTI<TTHEN54
2F  55 POKE1,39:PRINT"[UP2,C7,SP
    C6]PRESS STOP ON THE TAPE DR
    IVE"
BF  56 IFPEEK(1)<>55THEN56
54  57 PRINT"[CLR]";:GOSUB11:PRI
    NT"[UP4,S-,C1,C@38,C5,S-]";
FC  58 PRINT"[S-,C1,RVSON,SPC4]"
    ;W$(K);"[SPC4,RVSOFF,DOWN2]"
    :POKE646,C
FD  59 ONE(K)GOTO60,61,62,63,64,
    65,66
C0  60 PRINT"[DOWN,C7]HOLD DOWN
    SHIFT-KEY AND PRESS RUN/STOP
    ":GOTO73
```

```
3F   61 PRINT"[DOWN]LOAD"CHR$(34)
     CHR$(34)",1,1[C7,UP4]":POKE1
     98,1:POKE631,13:GOTO73
DF   62 PRINT"[DOWN]LOAD"CHR$(34)
     CHR$(34)",7[C7,UP4]":POKE198
     ,1:POKE631,13:GOTO73
05   63 :
7A   64 :
7B   65 :
78   66 :
AC   67 FORX=0TO104:POKE53270,X:P
     OKE54296,15:POKE54296,7:NEXT

8E   68 PRINT"[CLR,DOWN2,C1]FATAL
      ERROR  [S*3]  STOP-KEY HAS
     BEEN USED[DOWN2]"
BD   69 PRINT"[C7,SPC5]REWIND THE
      TAPE FOR 5 COUNTS[DOWN]"
1C   70 PRINT"[SPC6]AND LOAD THIS
      PROGRAM AGAIN[C1,DOWN2]":GO
     TO73
81   71 FORX=1TO6:PRINT"[RVSOFF,C
     1,RIGHT5,C@30,SPC5]";
ED   72 PRINT"[RVSON,RIGHT5]";W$(
     X):NEXT:RETURN
EB   73 NEW
C0   74 DATA" 1:[SPC27]",0
C0   75 DATA" 2:[SPC27]",0
D8   76 DATA" 3:[SPC27]",0
D8   77 DATA" 4:[SPC27]",0
D8   78 DATA" 5:[SPC27]",0
D8   79 DATA" 6:[SPC27]",0
59   80 DATA+0000,+0000,+0000,+00
     00,+0000,+0000
```

PROGRAM: LOADER.1

```
85   10 REM*****************
C9   20 REM*    LOADER 1    *
11   30 REM*    SPRITES     *
C7   40 REM*****************
99   2000 FORL=0TO156:CX=0:FORD=0
     TO15:READA:CX=CX+A:POKE12288
     +L*16+D,A:NEXTD
82   2010 READA:IFA<>CXTHENPRINT"
     ERROR IN LINE";2040+(L*10):S
     TOP
0F   2020 NEXTL:END
CE   2040 DATA0,0,0,3,192,32,15,2
     40,80,31,248,144,31,249,16,5
     1,1332
10   2050 DATA205,144,33,133,80,3
     6,37,32,19,201,0,24,25,0,7,2
     25,1201
82   2060 DATA0,63,253,0,127,255,
     0,151,239,0,103,231,0,15,252
     ,128,1817
58   2070 DATA12,123,128,12,0,0,3
     0,0,0,30,0,0,0,0,0,80,415
E3   2080 DATA0,0,0,3,192,32,15,2
     40,80,31,248,144,31,249,16,5
     1,1332
98   2090 DATA205,144,33,133,80,3
     6,37,32,19,201,0,24,25,0,7,2
     25,1201
C7   2100 DATA0,63,253,0,127,255,
     0,247,239,0,151,231,0,111,24
     4,128,2049
26   2110 DATA12,123,128,12,120,0
     ,30,0,0,30,0,0,0,0,0,80,535
BB   2120 DATA0,0,0,3,192,32,15,2
     40,80,31,248,144,31,249,16,5
     1,1332
20   2130 DATA205,144,33,133,80,3
     6,37,32,19,201,0,24,25,0,7,2
     25,1201
24   2140 DATA0,63,253,0,127,255,
     0,119,239,0,103,231,0,159,24
     4,128,1921
B8   2150 DATA108,51,128,12,48,0,
     30,120,0,30,120,0,0,0,0,80,7
     27
13   2160 DATA0,0,0,3,192,32,15,2
     40,80,31,248,144,31,249,16,5
     1,1332
68   2170 DATA205,144,33,133,80,3
     6,37,32,19,201,0,24,25,0,7,2
     25,1201
4C   2180 DATA0,63,253,0,127,255,
     0,103,239,0,151,231,0,111,24
     4,128,1905
05   2190 DATA12,51,128,30,48,0,3
     0,120,0,0,120,0,0,0,0,80,619
2B   2200 DATA0,0,0,3,192,32,15,2
     40,80,31,248,144,31,249,16,5
     1,1332
F0   2210 DATA205,144,33,133,80,3
     6,37,32,19,201,0,24,25,0,7,2
     25,1201
C6   2220 DATA0,63,253,0,127,255,
     0,151,239,0,103,231,0,15,244
     ,128,1809
43   2230 DATA30,51,128,30,48,0,0
     ,120,0,0,120,0,0,0,0,80,607
A0   2240 DATA0,0,0,64,60,0,160,2
     55,0,145,255,128,137,255,128
     ,155,1742
3F   2250 DATA255,192,171,255,192
     ,75,255,192,9,255,128,9,255,
     128,8,126,2505
E1   2260 DATA0,11,255,192,15,255
     ,224,15,126,144,14,126,96,19
     ,255,0,1747
59   2270 DATA29,227,0,0,3,0,0,7,
     128,0,7,128,0,0,0,80,609
B8   2280 DATA0,0,0,64,60,0,160,2
     55,0,145,255,128,137,255,128
     ,155,1742
C7   2290 DATA255,192,171,255,192
     ,75,255,192,9,255,128,9,255,
     128,8,126,2505
E7   2300 DATA0,11,255,192,15,255
     ,224,15,126,96,14,126,144,18
     ,255,96,1842
AD   2310 DATA29,227,0,1,227,0,0,
     7,128,0,7,128,0,0,0,80,834
8F   2320 DATA0,0,0,64,60,0,160,2
     55,0,145,255,128,137,255,128
     ,155,1742
60   2330 DATA255,192,171,255,192
     ,75,255,192,9,255,128,9,255,
     128,8,126,2505
B0   2340 DATA0,11,255,192,15,255
     ,224,15,126,96,14,126,96,18,
     255,144,1842
18   2350 DATA28,195,96,0,195,0,1
     ,231,128,1,231,128,0,0,0,80,
     1314
87   2360 DATA0,0,0,64,60,0,160,2
     55,0,145,255,128,137,255,128
     ,155,1742
E8   2370 DATA255,192,171,255,192
     ,75,255,192,9,255,128,9,255,
     128,8,126,2505
50   2380 DATA0,11,255,192,15,255
     ,224,15,126,96,14,126,144,18
     ,255,96,1842
91   2390 DATA28,195,0,0,199,128,
     1,231,128,1,224,0,0,0,0,80,1
     215
3F   2400 DATA0,0,0,64,60,0,160,2
     55,0,145,255,128,137,255,128
     ,155,1742
90   2410 DATA255,192,171,255,192
     ,75,255,192,9,255,128,9,255,
     128,8,126,2505
36   2420 DATA0,11,255,192,15,255
     ,224,15,126,144,14,126,96,18
     ,255,0,1746
04   2430 DATA28,199,128,0,199,12
     8,1,224,0,1,224,0,0,0,0,80,1
     212
DD   2440 DATA0,0,0,0,28,0,0,127,
     0,0,255,128,1,255,192,1,987
3A   2450 DATA248,64,1,240,64,1,2
     44,64,1,243,192,1,240,64,0,1
     27,1794
79   2460 DATA0,0,255,128,0,255,1
     28,0,255,128,0,255,128,0,127
     ,0,1659
E3   2470 DATA0,62,128,0,223,192,
     1,207,128,1,239,0,1,198,0,11
     2,1492
95   2480 DATA0,0,0,0,28,0,0,127,
     0,0,255,128,1,255,192,1,987
D2   2490 DATA248,64,1,240,64,1,2
     44,64,1,243,192,1,240,64,0,1
     27,1794
F1   2500 DATA0,0,255,128,0,255,1
     28,0,255,128,0,255,128,0,127
     ,0,1659
48   2510 DATA0,126,0,0,191,128,0
     ,223,128,0,239,0,0,110,0,112
     ,1257
0D   2520 DATA0,0,0,0,28,0,0,127,
     0,0,255,128,1,255,192,1,987
CA   2530 DATA248,64,1,240,64,1,2
     44,64,1,243,192,1,240,64,0,1
     27,1794
29   2540 DATA0,0,255,128,0,255,1
     28,0,255,128,0,255,128,0,127
     ,0,1659
0F   2550 DATA0,60,0,0,60,0,0,60,
     0,0,63,0,0,63,0,112,418
BC   2560 DATA0,0,0,0,28,0,0,127,
     0,0,255,128,1,255,192,1,987
7D   2570 DATA248,64,1,240,64,1,2
     44,64,1,243,192,1,240,64,0,1
     27,1794
6E   2580 DATA0,0,255,128,0,255,1
     28,0,255,128,0,255,128,0,127
     ,0,1659
CB   2590 DATA0,30,0,0,125,0,0,24
     7,128,0,239,128,0,110,0,112,
     1119
74   2600 DATA0,0,0,0,28,0,0,127,
     0,0,255,128,1,255,192,1,987
F5   2610 DATA248,64,1,240,64,1,2
     44,64,1,243,192,1,240,64,0,1
     27,1794
26   2620 DATA0,0,255,128,0,255,1
     28,0,255,128,0,255,128,0,127
     ,0,1659
CE   2630 DATA0,62,0,0,249,192,1,
     247,192,1,207,0,1,134,0,112,
     1398
30   2640 DATA0,0,0,0,56,0,0,254,
     0,1,255,0,3,255,128,2,954
2C   2650 DATA31,128,2,15,128,2,4
     7,128,3,207,128,2,15,128,0,2
     54,1218
5C   2660 DATA0,1,255,0,1,255,0,1
     ,255,0,1,255,0,0,254,0,1278
66   2670 DATA1,124,0,3,251,0,1,2
     43,128,0,247,128,0,99,128,11
     2,1465
D8   2680 DATA0,0,0,0,56,0,0,254,
     0,1,255,0,3,255,128,2,954
A4   2690 DATA31,128,2,15,128,2,4
     7,128,3,207,128,2,15,128,0,2
     54,1218
34   2700 DATA0,1,255,0,1,255,0,1
     ,255,0,1,255,0,0,254,0,1278
31   2710 DATA0,126,0,1,253,0,1,2
     51,0,0,247,0,0,118,0,64,1061

80   2720 DATA0,0,0,0,56,0,0,254,
     0,1,255,0,3,255,128,2,954
BC   2730 DATA31,128,2,15,128,2,4
     7,128,3,207,128,2,15,128,0,2
```

```
    54,1218
8C  2740 DATA0,1,255,0,1,255,0,1
    ,255,0,1,255,0,0,254,0,1278
44  2750 DATA0,60,0,0,60,0,0,60,
    0,0,252,0,0,252,0,64,748
A8  2760 DATA0,0,0,0,56,0,0,254,
    0,1,255,0,3,255,128,2,954
34  2770 DATA31,128,2,15,128,2,4
    7,128,3,207,128,2,15,128,0,2
    54,1218
E4  2780 DATA0,1,255,0,1,255,0,1
    ,255,0,1,255,0,0,254,0,1278
8C  2790 DATA0,120,0,0,190,0,1,2
    39,0,1,247,0,0,118,0,64,980
D0  2800 DATA0,0,0,0,56,0,0,254,
    0,1,255,0,3,255,128,2,954
8C  2810 DATA31,128,2,15,128,2,4
    7,128,3,207,128,2,15,128,0,2
    54,1218
91  2820 DATA0,1,255,0,1,255,0,1
    ,255,0,1,255,0,0,254,0,1278
B0  2830 DATA0,124,0,3,159,0,3,2
    39,128,0,243,128,0,97,128,40
    ,1292
E5  2840 DATA0,0,0,0,0,0,0,0,0,4
    ,0,32,14,0,112,31,193
02  2850 DATA0,248,63,129,252,10
    3,165,230,163,255,197,3,219,
    192,5,255,2479
C5  2860 DATA160,1,126,128,0,231
    ,0,0,219,0,0,66,0,0,66,0,997

6E  2870 DATA0,195,0,1,36,128,0,
    0,0,0,0,0,0,0,0,40,400
D8  2880 DATA0,0,0,0,0,0,0,85,0,
    1,85,64,5,85,64,5,394
FA  2890 DATA85,64,7,87,64,7,87,
    80,5,85,80,5,85,80,37,85,943

F9  2900 DATA80,37,85,84,37,86,8
    4,37,154,88,38,170,152,42,16
    9,168,1511
B3  2910 DATA174,174,168,174,175
    ,172,191,179,236,243,192,240
    ,0,0,0,191,2509
91  2920 DATA0,0,0,0,0,0,0,0,0,0
    ,32,0,0,32,0,8,72
99  2930 DATA8,0,2,38,0,2,38,128
    ,2,166,0,2,150,0,2,154,692
7E  2940 DATA0,2,153,128,2,105,1
    28,2,105,136,2,105,160,2,105
    ,152,1287
7F  2950 DATA10,89,152,9,85,96,9
    ,125,88,47,195,252,0,0,0,255
    ,1412
75  2960 DATA0,0,0,0,0,0,0,32,0,
    0,184,0,2,150,0,0,368
0A  2970 DATA86,0,0,22,0,0,22,0,
    0,22,0,0,24,0,0,24,200
A0  2980 DATA0,0,24,0,0,24,0,0,2
    4,32,10,170,128,32,96,0,540
86  2990 DATA33,128,0,10,0,0,0,0
    ,0,0,0,0,0,0,0,183,354
46  3000 DATA0,0,0,0,112,96,14,9
    ,152,16,2,4,0,98,4,16,523
B3  3010 DATA0,4,40,0,8,64,0,212
    ,67,192,34,72,0,34,16,8,751
5A  3020 DATA32,0,28,40,10,8,68,
    0,0,4,64,0,4,68,4,8,338
26  3030 DATA66,8,34,49,244,34,4
    ,3,210,2,32,12,1,192,0,255,1
    146
F7  3040 DATA0,0,0,0,0,0,0,0,0,0
    ,149,86,2,255,148,0,640
CD  3050 DATA149,96,2,95,244,15,
    245,80,2,85,64,0,95,224,0,53
    ,1449
5D  3060 DATA64,0,11,244,0,2,80,
    0,15,64,0,9,240,0,3,148,880
5D  3070 DATA0,1,112,0,1,192,0,0
    ,80,0,0,20,0,0,0,255,661
93  3080 DATA12,21,0,12,85,64,4,
    68,64,4,68,64,4,85,64,7,626
3F  3090 DATA255,240,7,245,80,7,
    246,144,7,245,144,7,245,144,
    7,245,2268
35  3100 DATA144,4,245,144,4,246
    ,144,4,245,80,4,161,64,4,162
    ,128,1783
BD  3110 DATA4,162,128,4,128,128
    ,6,128,160,6,128,160,0,0,0,2
    55,1397
0D  3120 DATA0,36,0,0,40,8,0,118
    ,18,0,248,20,0,246,60,0,794
CC  3130 DATA248,112,0,244,254,1
    ,249,248,1,243,254,1,231,240
    ,1,239,2566
FF  3140 DATA252,11,255,224,31,2
    55,144,33,254,0,0,252,0,0,25
    4,0,1965
4F  3150 DATA0,127,128,0,255,224
    ,1,15,192,7,3,128,8,128,0,18
    3,1399
36  3160 DATA0,4,0,0,4,0,0,20,0,
    0,20,0,0,20,12,0,80
0C  3170 DATA40,12,0,40,12,0,85,
    12,5,85,76,9,85,76,5,93,635
C0  3180 DATA92,5,85,88,1,85,88,
    1,213,92,1,85,28,1,85,12,962

E0  3190 DATA1,85,12,1,87,76,3,8
    5,76,5,85,92,0,0,0,255,863
3F  3200 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,0
5A  3210 DATA0,0,240,20,0,240,40
    ,0,240,40,0,49,85,64,49,85,1
    152
37  3220 DATA64,53,85,64,53,85,6
    4,36,85,64,0,85,128,0,85,0,9
    51
B7  3230 DATA0,65,0,0,65,0,3,65,
    192,3,195,192,0,0,0,191,971
D2  3240 DATA1,0,64,3,0,64,1,20,
    64,1,28,192,1,20,64,1,524
E7  3250 DATA85,64,1,221,64,0,85
    ,0,0,93,0,0,85,0,0,247,945
EF  3260 DATA0,0,87,0,0,119,0,0,
    77,0,0,77,0,0,65,0,425
7D  3270 DATA0,67,0,1,67,64,1,65
    ,64,0,0,0,0,0,0,255,584
8F  3280 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,0
B3  3290 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,7,7
69  3300 DATA224,0,15,240,0,24,2
    4,0,24,24,0,24,24,0,24,24,67
    1
E4  3310 DATA7,216,24,15,236,48,
    24,54,96,48,31,255,48,31,255
    ,182,1570
50  3320 DATA48,31,255,48,31,255
    ,24,54,96,15,236,48,7,216,24
    ,0,1388
0E  3330 DATA24,24,0,24,24,0,24,
    24,0,24,24,0,15,240,0,7,454
3A  3340 DATA224,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,0,224
18  3350 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,64,64
DE  3360 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
E4  3370 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
F2  3380 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
7C  3390 DATA0,0,0,0,0,0,0,0,0,2
    55,255,252,255,255,252,24,15
    48
DA  3400 DATA255,255,252,255,255
    ,252,0,7,248,0,3,240,0,3,240
    ,0,2265
0B  3410 DATA7,248,0,6,216,0,6,2
    16,0,0,0,0,0,0,0,0,699
1A  3420 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,0
20  3430 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,0
A8  3440 DATA0,0,0,0,112,96,14,9
    ,152,16,2,4,0,98,4,16,523
B9  3450 DATA0,4,40,0,8,64,0,212
    ,67,192,34,72,0,34,16,8,751
78  3460 DATA32,0,28,40,10,8,68,
    0,0,4,64,0,4,68,4,8,338
5B  3470 DATA66,8,34,49,244,34,4
    ,3,210,2,32,12,1,192,0,32,92
    3
E9  3480 DATA0,0,0,0,0,0,0,0,0,0
    ,28,0,0,34,0,15,77
F9  3490 DATA161,0,16,91,0,16,68
    ,128,19,4,128,8,1,64,7,16,72
    7
C7  3500 DATA32,2,12,32,4,210,64
    ,4,33,128,3,210,128,0,140,12
    8,1130
69  3510 DATA0,152,128,0,103,0,0
    ,0,0,0,0,0,0,0,0,169,552
7E  3520 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
1C  3530 DATA0,0,0,118,0,0,137,0
    ,3,136,128,4,86,128,4,129,87
    3
76  3540 DATA0,2,145,0,1,110,0,0
    ,0,0,0,0,0,0,0,0,258
9C  3550 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,2,2
A6  3560 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
22  3570 DATA0,0,0,0,0,0,16,0,0,
    2,0,0,40,0,0,0,58
8A  3580 DATA0,0,8,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,8
4D  3590 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,76,76
5A  3600 DATA0,104,0,40,0,104,2,
    104,0,104,0,106,0,104,0,104,
    772
```

PROGRAM: LOADER.2

```
AF  10 REM*****************
DC  20 REM*   LOADER.2    *
C2  30 REM* CHARACTER SET *
F1  40 REM*****************
04  2000 FORL=0TO128:CX=0:FORD=0
    TO15:READA:CX=CX+A:POKE10240
    +L*16+D,A:NEXTD
82  2010 READA:IFA<>CXTHENPRINT"
    ERROR IN LINE";2040+(L*10):S
    TOP
0F  2020 NEXTL:END
3F  2040 DATA0,0,0,0,0,0,0,0,231
    ,219,189,129,189,189,189,255
    ,1590
40  2050 DATA131,189,189,131,189
    ,189,131,255,195,189,191,191
    ,191,189,195,255,3000
D1  2060 DATA135,187,189,189,189
    ,187,135,255,129,191,191,135
    ,191,191,129,255,2878
FD  2070 DATA129,191,191,135,191
    ,191,191,255,195,189,191,177
    ,189,189,195,255,3054
33  2080 DATA189,189,189,129,189
    ,189,189,255,199,239,239,239
    ,239,239,199,255,3366
```

```
A0  2090 DATA227,247,247,247,247
    ,183,207,255,187,183,175,159
    ,175,183,187,255,3364
0D  2100 DATA191,191,191,191,191
    ,191,129,255,190,156,170,182
    ,190,190,190,255,3053
48  2110 DATA221,221,205,213,217
    ,221,221,255,195,189,189,189
    ,189,189,195,255,3364
39  2120 DATA131,189,189,131,191
    ,191,191,255,195,189,189,189
    ,165,181,193,255,3024
80  2130 DATA131,189,189,131,183
    ,187,189,255,195,189,191,195
    ,253,189,195,255,3116
FE  2140 DATA131,239,239,239,239
    ,239,239,255,189,189,189,189
    ,189,189,195,255,3404
1A  2150 DATA189,189,189,189,189
    ,219,231,255,190,190,190,182
    ,170,156,190,255,3173
F9  2160 DATA189,219,231,231,219
    ,189,189,255,221,221,221,227
    ,247,247,247,255,3608
FB  2170 DATA129,253,251,247,239
    ,223,129,255,255,255,255,255
    ,15,15,15,15,2806
06  2180 DATA255,255,221,235,247
    ,235,221,255,15,15,15,15,15,
    15,15,15,2044
DA  2190 DATA15,15,15,15,255,255
    ,255,255,240,240,240,240,255
    ,255,255,255,3060
C4  2200 DATA255,255,255,255,255
    ,255,255,255,0,0,0,0,255,255
    ,255,255,3060
A8  2210 DATA102,102,102,0,0,0,0
    ,0,240,0,240,0,255,0,255,0,1
    296
2E  2220 DATA0,0,0,0,255,0,255,0
    ,15,15,15,15,255,7,255,1,108
    8
FD  2230 DATA60,102,60,56,103,10
    2,63,0,6,12,24,0,0,0,0,0,588

83  2240 DATA255,255,255,31,31,3
    1,31,31,31,31,31,31,31,31,31
    ,31,1168
BE  2250 DATA31,31,31,255,255,25
    5,255,255,0,0,0,255,255,255,
    255,255,2643
FC  2260 DATA240,240,240,255,255
    ,255,255,255,240,240,240,255
    ,255,255,255,255,3990
AB  2270 DATA255,255,255,255,207
    ,207,255,255,0,3,6,12,24,48,
    96,0,2133
E2  2280 DATA227,221,221,221,221
    ,221,227,255,247,231,247,247
    ,247,247,227,255,3762
97  2290 DATA195,187,251,247,239
    ,223,131,255,195,189,253,227
    ,253,189,195,255,3484
B1  2300 DATA249,245,237,221,128
    ,253,253,255,129,191,131,253
    ,253,189,195,255,3437
E7  2310 DATA195,189,191,131,189
    ,189,195,255,129,189,251,247
    ,239,239,239,255,3322
62  2320 DATA195,189,189,195,189
    ,189,195,255,195,189,189,193
    ,253,189,195,255,3254
8C  2330 DATA255,255,231,255,255
    ,231,255,255,0,0,24,0,0,24,2
    4,48,2112
64  2340 DATA14,24,48,96,48,24,1
    4,0,255,255,129,255,129,255,
    255,255,2056
5E  2350 DATA112,24,12,6,12,24,1
    12,0,195,189,253,243,239,255
    ,239,255,2170
F2  2360 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
F8  2370 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
06  2380 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
0C  2390 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
38  2400 DATA224,239,224,248,251
    ,251,253,253,0,255,0,0,255,2
    55,255,255,3218
74  2410 DATA7,247,7,31,223,223,
    191,191,254,255,255,255,255,
    255,255,254,3158
60  2420 DATA255,126,189,219,219
    ,153,0,0,127,255,255,255,255
    ,255,255,127,2945
0B  2430 DATA252,252,248,248,248
    ,224,239,224,0,0,0,0,63,0,25
    5,0,2253
86  2440 DATA63,63,31,31,31,7,19
    9,7,224,60,126,126,126,126,6
    0,0,1280
9E  2450 DATA255,254,253,253,251
    ,251,251,251,255,255,127,159
    ,233,244,252,228,3772
67  2460 DATA255,255,255,255,255
    ,255,255,255,253,253,254,255
    ,255,255,255,255,4075
10  2470 DATA132,4,4,52,116,244,
    244,244,255,255,255,255,255,
    255,255,255,3080
5E  2480 DATA255,255,255,255,255
    ,255,255,255,244,244,244,244
    ,244,240,252,255,4007
28  2490 DATA255,255,255,255,255
    ,255,255,255,255,255,255,252
    ,227,223,239,247,3993
82  2500 DATA255,255,255,36,195,
    231,231,231,255,255,255,63,1
    99,251,247,239,3453
09  2510 DATA251,253,254,255,255
    ,255,255,255,231,231,231,102
    ,165,195,231,231,3650
D4  2520 DATA223,191,127,255,255
    ,255,255,255,255,255,255,255
    ,255,255,255,255,3856
9E  2530 DATA231,231,231,231,255
    ,255,255,255,255,255,255,255
    ,255,255,255,255,3984
17  2540 DATA255,255,255,249,250
    ,251,251,251,255,255,255,231
    ,219,60,254,189,3735
EF  2550 DATA255,255,255,159,79,
    199,199,199,253,253,253,253,
    253,254,254,254,3627
07  2560 DATA27,183,238,221,187,
    119,235,209,199,7,143,143,14
    3,15,31,31,2131
62  2570 DATA255,255,255,255,255
    ,255,255,255,58,188,192,240,
    255,255,255,255,3738
47  2580 DATA63,63,127,255,255,2
    55,255,255,255,255,255,255,2
    55,255,255,255,3568
19  2590 DATA239,215,211,211,211
    ,211,211,211,255,255,255,255
    ,255,255,255,255,3760
9D  2600 DATA255,255,255,255,255
    ,255,255,255,211,211,211,211
    ,211,211,211,211,3728
1C  2610 DATA255,255,255,255,255
    ,255,255,255,253,254,255,255
    ,255,255,255,255,4077
57  2620 DATA211,0,16,211,211,21
    1,195,227,127,127,255,255,25
    5,255,255,255,3066
90  2630 DATA7,7,7,7,7,7,7,7,255
    ,255,0,0,0,0,0,0,566
AE  2640 DATA255,255,255,0,0,0,0
    ,0,0,0,0,0,0,255,255,255,153
    0
4A  2650 DATA3,3,3,3,3,3,255,255
    ,0,0,0,0,0,0,0,0
03  2660 DATA15,15,15,15,0,0,0,0
    ,24,24,24,248,248,0,0,0,628
81  2670 DATA240,240,240,240,0,0
    ,0,0,240,240,240,240,15,15,1
    5,15,1980
B5  2680 DATA170,234,170,174,169
    ,167,159,159,170,149,127,127
    ,255,255,119,223,2827
6F  2690 DATA170,174,106,218,246
    ,218,246,222,127,127,159,125
    ,151,157,151,165,2762
26  2700 DATA255,255,255,255,119
    ,221,119,245,255,245,255,253
    ,246,90,106,170,3344
C9  2710 DATA169,169,234,174,169
    ,169,187,170,246,86,86,86,86
    ,85,101,170,2387
A0  2720 DATA170,186,170,174,170
    ,234,171,186,170,170,234,171
    ,170,170,174,170,2890
71  2730 DATA255,223,253,127,253
    ,246,218,214,255,223,245,218
    ,90,169,169,169,3327
CA  2740 DATA223,255,119,159,151
    ,85,105,170,255,125,255,223,
    255,255,119,159,2913
75  2750 DATA214,213,197,241,240
    ,124,255,223,165,85,80,64,0,
    63,223,253,2640
0B  2760 DATA106,85,85,21,0,195,
    255,247,95,95,79,61,255,255,
    119,255,2208
BB  2770 DATA127,251,255,255,223
    ,255,254,191,255,239,253,255
    ,127,251,255,255,3701
7A  2780 DATA191,245,218,218,214
    ,197,240,191,251,127,157,157
    ,89,72,25,255,2847
DF  2790 DATA255,253,95,167,167,
    83,15,255,255,255,189,246,24
    6,218,218,245,3162
EF  2800 DATA223,255,127,159,167
    ,169,169,170,239,255,255,127
    ,255,255,251,127,3203
D5  2810 DATA253,255,255,239,255
    ,255,255,95,245,245,241,177,
    252,255,247,255,3779
7F  2820 DATA170,106,85,85,85,0,
    255,255,125,93,93,64,8,170,2
    55,255,2104
C3  2830 DATA167,169,85,85,20,13
    1,255,255,127,255,235,254,25
    5,175,255,245,2968
2B  2840 DATA175,255,215,255,254
    ,235,255,127,127,255,235,254
    ,215,255,191,235,3538
41  2850 DATA0,85,85,85,0,85,85,
    85,0,64,80,64,0,64,80,64,926

F9  2860 DATA0,60,60,60,0,60,60,
    60,0,60,60,60,0,60,60,60,720

E4  2870 DATA0,60,60,0,20,20,20,
    20,171,234,170,174,0,85,85,8
    5,1204
EE  2880 DATA171,234,170,186,0,6
    4,80,64,171,175,171,190,255,
    175,255,245,2606
F8  2890 DATA175,255,215,254,254
    ,234,250,106,170,170,170,170
    ,171,171,175,191,3131
30  2900 DATA254,250,234,234,170
    ,170,170,170,170,233,167,159
    ,159,157,167,167,3031
32  2910 DATA170,93,247,255,127,
    221,247,223,170,107,218,246,
    118,253,253,246,3194
F6  2920 DATA159,157,159,165,177
    ,172,187,174,127,253,119,221
    ,117,84,3,254,2528
```

```
44  2930 DATA246,214,90,222,123,
    46,250,174,170,93,247,255,12
    7,221,247,223,2948
EC  2940 DATA247,217,217,217,217
    ,217,217,218,247,217,217,217
    ,217,217,105,105,3309
CE  2950 DATA218,246,189,253,253
    ,221,252,240,167,159,157,159
    ,159,79,63,255,3070
E5  2960 DATA85,154,154,153,86,1
    53,106,84,85,154,85,105,105,
    150,0,0,1659
D6  2970 DATA85,154,154,90,149,1
    02,169,21,104,104,104,84,104
    ,104,104,104,1736
91  2980 DATA0,0,0,0,0,0,0,0,41,
    41,41,21,41,41,41,41,308
0C  2990 DATA84,104,104,104,104,
    84,104,104,0,0,0,0,0,0,0,0,7
    92
B2  3000 DATA21,41,41,41,41,21,4
    1,41,85,154,154,154,85,169,1
    69,169,1427
1F  3010 DATA0,0,84,84,84,84,84,
    84,0,0,168,168,168,168,168,1
    68,1512
61  3020 DATA0,20,86,170,170,171
    ,255,255,0,81,89,170,174,255
    ,255,255,2406
47  3030 DATA85,152,152,144,80,1
    60,160,160,85,26,26,10,5,9,9
    ,9,1272
D3  3040 DATA80,144,144,144,85,1
    54,154,149,5,10,10,10,85,165
    ,165,85,1589
42  3050 DATA170,175,190,170,174
    ,234,170,174,170,170,186,171
    ,170,234,175,190,2923
B7  3060 DATA170,166,175,189,159
    ,167,165,170,170,170,90,254,
    221,246,86,90,2688
F6  3070 DATA234,154,175,191,170
    ,165,250,170,170,111,170,249
    ,170,190,170,90,2829
DF  3080 DATA0,0,252,252,252,252
    ,252,252,106,166,190,170,105
    ,154,190,175,2768
3D  3090 DATA169,250,166,190,170
    ,246,90,175,21,148,145,20,14
    5,132,17,68,2152
63  3100 DATA16,69,17,69,21,69,2
    1,85,255,255,255,255,255,255
    ,255,255,2407
E1  3110 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
D8  3120 DATA231,231,153,153,231
    ,231,195,255,249,249,249,249
    ,249,249,249,249,3672
D7  3130 DATA247,227,193,128,193
    ,227,247,255,231,231,231,0,0
    ,231,231,231,3103
CA  3140 DATA63,63,207,207,63,63
    ,207,207,231,231,231,231,231
    ,231,231,231,2928
49  3150 DATA255,255,252,193,137
    ,201,201,255,0,128,192,224,2
    40,248,252,254,3287
E6  3160 DATA255,255,255,255,255
    ,255,255,255,15,15,15,15,15,
    15,15,15,2160
18  3170 DATA255,255,255,255,0,0
    ,0,0,0,255,255,255,255,255,2
    55,255,2805
08  3180 DATA255,255,255,255,255
    ,255,255,0,63,63,63,63,63,63
    ,63,63,2289
DD  3190 DATA51,51,204,204,51,51
    ,204,204,252,252,252,252,252
    ,252,252,252,3036
D7  3200 DATA255,255,255,255,51,
    51,204,204,0,1,3,7,15,31,63,
    127,1777
75  3210 DATA252,252,252,252,252
    ,252,252,252,231,231,231,224
    ,224,231,231,231,3850
86  3220 DATA255,255,255,255,240
    ,240,240,240,231,231,231,224
    ,224,255,255,255,3886
3E  3230 DATA255,255,255,7,7,231
    ,231,231,255,255,255,255,255
    ,255,0,0,3002
D7  3240 DATA255,255,255,224,224
    ,231,231,231,231,231,231,0,0
    ,255,255,255,3364
F8  3250 DATA255,255,255,0,0,231
    ,231,231,231,231,231,7,7,231
    ,231,231,2858
39  3260 DATA63,63,63,63,63,63,6
    3,63,31,31,31,31,31,31,31,31
    ,752
DA  3270 DATA248,248,248,248,248
    ,248,248,248,0,0,255,255,255
    ,255,255,255,3514
D5  3280 DATA0,0,0,255,255,255,2
    55,255,255,255,255,255,255,0
    ,0,0,2550
85  3290 DATA252,252,252,252,252
    ,252,0,0,255,255,255,255,15,
    15,15,15,2592
8D  3300 DATA240,240,240,240,255
    ,255,255,255,231,231,231,7,7
    ,255,255,255,3452
22  3310 DATA15,15,15,15,255,255
    ,255,255,15,15,15,15,240,240
    ,240,240,2100
50  3320 DATA48,31,255,48,31,255
    ,24,54,96,15,236,48,7,216,24
    ,0,1388
```

PROGRAM: LOADER.3

```
85  10 REM*****************
B9  20 REM*   LOADER.3    *
84  30 REM*  HOUR-GLASS   *
C7  40 REM*****************
9B  2000 FORL=0TO45:CX=0:FORD=0T
    O15:READA:CX=CX+A:POKE8192+L
    *16+D,A:NEXTD
82  2010 READA:IFA<>CXTHENPRINT"
    ERROR IN LINE";2040+(L*10):S
    TOP
0F  2020 NEXTL:END
02  2040 DATA224,239,224,248,251
    ,251,253,253,0,255,0,0,255,2
    55,255,255,3218
83  2050 DATA7,247,7,31,223,223,
    191,191,254,255,255,255,255,
    255,255,254,3158
BD  2060 DATA255,126,189,219,219
    ,153,0,0,127,255,255,255,255
    ,255,255,127,2945
5C  2070 DATA252,252,248,248,248
    ,224,239,224,0,0,0,0,63,0,25
    5,0,2253
FB  2080 DATA63,63,31,31,31,7,19
    9,7,224,239,224,248,251,251,
    253,253,2375
A4  2090 DATA0,255,0,0,195,255,2
    55,255,7,247,7,31,223,223,19
    1,191,2335
71  2100 DATA254,255,255,255,255
    ,255,255,254,255,126,189,219
    ,219,153,0,24,3223
37  2110 DATA127,255,255,255,255
    ,255,255,127,252,252,248,248
    ,248,224,239,224,3719
D9  2120 DATA0,0,0,28,63,0,255,0
    ,63,63,31,31,31,7,199,7,778
34  2130 DATA224,239,224,248,248
    ,251,253,253,0,255,0,0,129,2
    27,255,255,3061
0D  2140 DATA7,247,7,31,223,223,
    191,191,254,255,255,255,255,
    255,255,254,3158
01  2150 DATA255,126,189,219,219
    ,153,0,24,127,255,255,255,25
    5,255,255,127,2969
E7  2160 DATA252,252,248,248,248
    ,224,239,224,0,0,16,124,255,
    0,255,0,2585
63  2170 DATA63,63,31,31,31,7,19
    9,7,224,239,224,248,248,249,
    253,253,2370
B8  2180 DATA0,255,0,0,128,129,2
    31,255,7,247,7,31,31,95,191,
    191,1798
BB  2190 DATA254,255,255,255,255
    ,255,255,254,255,126,189,219
    ,219,153,0,0,3199
3F  2200 DATA127,255,255,255,255
    ,255,255,127,252,252,248,249
    ,251,224,239,224,3723
2A  2210 DATA16,0,28,127,255,0,2
    55,0,63,63,31,159,223,7,199,
    7,1433
D0  2220 DATA224,239,224,248,248
    ,248,253,253,0,255,0,0,0,0,2
    31,255,2678
A6  2230 DATA7,247,7,31,31,31,63
    ,191,254,255,255,255,255,255
    ,255,254,2646
31  2240 DATA255,126,189,219,219
    ,137,16,8,127,255,255,255,25
    5,255,255,127,2953
53  2250 DATA252,252,249,249,251
    ,224,239,224,16,24,127,255,2
    55,0,255,0,2872
F9  2260 DATA63,63,31,159,223,7,
    199,7,224,239,224,248,248,24
    8,252,252,2687
6E  2270 DATA0,255,0,0,0,0,0,255
    ,7,247,7,31,31,31,63,63,990
40  2280 DATA254,255,255,255,255
    ,255,255,254,255,126,189,219
    ,219,137,16,8,3207
33  2290 DATA127,255,255,255,255
    ,255,255,127,252,252,251,251
    ,251,224,239,224,3728
D1  2300 DATA16,126,255,255,255,
    0,255,0,63,63,159,159,223,7,
    199,7,2042
53  2310 DATA224,239,224,248,248
    ,248,252,252,0,255,0,0,0,0,0
    ,48,2238
7B  2320 DATA7,247,7,31,31,31,63
    ,63,254,255,255,255,255,255,
    255,254,2518
5C  2330 DATA255,126,189,219,219
    ,137,16,8,127,255,255,255,25
    5,255,255,127,2953
0C  2340 DATA252,252,251,251,251
    ,224,239,224,126,255,255,255
    ,255,0,255,0,3345
32  2350 DATA63,63,223,223,223,7
    ,199,7,224,239,224,248,248,2
    48,252,252,2943
B8  2360 DATA0,255,0,0,0,0,0,0,7
    ,247,7,31,31,31,63,63,735
ED  2370 DATA254,255,255,255,255
    ,255,255,254,199,126,189,219
    ,219,137,16,56,3199
FB  2380 DATA127,255,255,255,255
    ,255,255,127,253,253,251,251
    ,251,224,239,224,3730
D2  2390 DATA255,255,255,255,255
```

```
    ,0,255,0,191,191,223,223,223
    ,7,199,7,2794
4E  2400 DATA224,239,224,248,248
    ,248,252,252,0,255,0,0,0,0,0
    ,0,2190
A9  2410 DATA7,247,7,31,31,31,63
    ,63,254,255,255,255,255,255,
    255,254,2518
AE  2420 DATA0,70,189,219,219,13
    7,16,255,127,255,255,255,255
    ,255,255,127,2889
EA  2430 DATA253,253,251,251,251
    ,224,239,224,255,255,255,255
    ,255,0,255,0,3476
30  2440 DATA191,191,223,223,223
    ,7,199,7,224,239,224,248,248
    ,248,252,252,3199
76  2450 DATA0,255,0,0,0,0,0,0,7
    ,247,7,31,31,31,63,63,735
05  2460 DATA254,255,255,255,255
    ,255,255,254,0,0,129,195,195
    ,129,126,255,3067
41  2470 DATA127,255,255,255,255
    ,255,255,127,253,253,251,251
    ,251,224,239,224,3730
7E  2480 DATA255,255,255,255,255
    ,0,255,0,191,191,223,223,223
    ,7,247,7,2842
C7  2490 DATA195,207,207,207,207
    ,207,195,255,32,32,210,255,1
    69,92,32,210,2712
```

PROGRAM: LOADER.4

```
AF  10 REM**********************
82  20 REM*     LOADER.4       *
23  30 REM OBJECT CODE PART 1 *
59  40 REM**********************
98  2000 FORL=0TO89:CX=0:FORD=0T
    O15:READA:CX=CX+A:POKE6144+L
    *16+D,A:NEXTD
82  2010 READA:IFA<>CXTHENPRINT"
    ERROR IN LINE";2040+(L*10):S
    TOP
0F  2020 NEXTL:END
CF  2040 DATA76,182,24,76,57,25,
    76,83,25,76,21,27,234,234,23
    4,8,1458
61  2050 DATA10,60,3,168,169,0,1
    33,251,133,252,192,0,240,25,
    192,10,1838
29  2060 DATA208,5,160,0,76,55,2
    4,24,165,251,105,72,133,251,
    165,252,1946
24  2070 DATA105,0,133,252,136,2
    08,240,24,105,32,133,252,160
    ,0,177,251,2208
46  2080 DATA153,64,42,200,192,7
    3,208,246,96,169,130,160,28,
    32,30,171,1994
70  2090 DATA169,8,141,172,2,169
    ,135,160,28,32,30,171,206,17
    2,2,208,1805
E3  2100 DATA244,169,164,160,28,
    32,30,171,169,27,141,105,4,9
    6,162,2,1704
7D  2110 DATA160,5,24,32,240,255
    ,173,178,2,32,140,24,96,162,
    7,160,1690
AC  2120 DATA5,24,32,240,255,173
    ,179,2,32,140,24,96,240,16,2
    01,1,1660
84  2130 DATA240,20,201,2,240,24
    ,169,89,160,29,32,30,171,96,
    169,231,1903
0D  2140 DATA160,28,32,30,171,96
    ,169,13,160,29,32,30,171,96,
    169,51,1437
B4  2150 DATA160,29,32,30,171,96
    ,169,3,141,134,2,169,147,32,
    210,255,1780
E0  2160 DATA169,0,141,33,208,16
    9,12,141,32,208,169,26,141,2
    4,208,32,1713
E1  2170 DATA245,24,32,73,24,32,
    110,24,32,125,24,162,5,160,3
    2,24,1128
AF  2180 DATA32,240,255,169,193,
    160,28,32,30,171,169,0,32,19
    ,24,169,1723
0F  2190 DATA27,141,6,6,96,162,1
    2,160,0,24,32,240,255,169,15
    3,160,1643
CB  2200 DATA27,32,30,171,169,10
    ,141,172,2,169,196,160,27,32
    ,30,171,1539
6F  2210 DATA206,172,2,208,244,1
    69,239,160,27,32,30,171,96,1
    62,18,160,2096
EB  2220 DATA0,24,32,240,255,169
    ,239,160,27,32,30,171,169,15
    3,160,27,1888
58  2230 DATA32,30,171,169,19,32
    ,210,255,96,162,20,160,0,24,
    32,240,1652
0D  2240 DATA255,169,3,141,172,2
    ,169,24,160,28,32,30,171,206
    ,172,2,1736
C3  2250 DATA208,244,96,162,12,1
    60,0,24,32,240,255,169,8,141
    ,172,2,1925
3B  2260 DATA169,24,160,28,32,30
    ,171,206,172,2,208,244,169,2
    7,141,6,1789
DB  2270 DATA6,96,169,32,141,104
    ,7,141,105,7,141,106,7,169,0
    ,141,1372
01  2280 DATA172,2,141,173,2,133
    ,162,169,255,141,175,2,32,22
    8,255,208,2250
BA  2290 DATA34,172,173,2,204,16
    ,24,208,3,76,149,26,165,162,
    205,17,1636
F1  2300 DATA24,208,233,238,173,
    2,169,0,133,162,173,173,2,32
    ,19,24,1765
56  2310 DATA76,140,25,201,13,24
    0,35,201,20,208,20,32,57,25,
    169,32,1494
2E  2320 DATA141,104,7,141,105,7
    ,141,106,7,32,127,29,76,140,
    25,201,1389
D8  2330 DATA47,144,185,201,58,1
    76,181,76,221,25,76,252,25,1
    41,167,2,1977
7F  2340 DATA173,105,7,141,104,7
    ,173,106,7,141,105,7,173,167
    ,2,141,1559
57  2350 DATA106,7,238,172,2,173
    ,172,2,201,3,208,144,169,255
    ,141,174,2167
59  2360 DATA2,173,106,7,201,32,
    240,72,56,233,48,141,174,2,1
    73,105,1765
A2  2370 DATA7,201,32,240,46,56,
    233,48,168,24,173,174,2,105,
    10,141,1660
8F  2380 DATA174,2,136,208,244,1
    73,104,7,201,32,240,23,233,4
    8,201,1,2027
F0  2390 DATA240,8,169,255,141,1
    74,2,76,80,26,24,173,174,2,1
    05,100,1749
05  2400 DATA141,174,2,173,174,2
    ,205,171,2,208,5,169,0,141,1
    75,2,1744
85  2410 DATA173,175,2,240,45,32
    ,57,25,162,20,160,5,24,32,24
    0,255,1647
07  2420 DATA169,67,160,28,32,30
    ,171,162,21,160,0,24,32,240,
    255,169,1720
45  2430 DATA130,160,27,32,30,17
    1,32,199,26,169,0,172,171,2,
    32,11,1364
A4  2440 DATA27,96,32,57,25,162,
    21,160,5,24,32,240,255,169,9
    8,160,1563
4F  2450 DATA28,32,30,171,96,169
    ,255,141,175,2,32,57,25,162,
    20,160,1555
95  2460 DATA5,24,32,240,255,169
    ,73,160,27,32,30,171,162,21,
    160,0,1561
94  2470 DATA24,32,240,255,169,1
    30,160,27,32,30,171,32,199,2
    6,169,0,1696
C2  2480 DATA172,171,2,32,11,27,
    96,162,21,160,23,24,32,240,2
    55,172,1600
DB  2490 DATA15,24,169,0,32,11,2
    7,169,32,32,210,255,169,92,3
    2,210,1479
64  2500 DATA255,172,169,2,169,0
    ,32,11,27,169,29,32,210,255,
    169,61,1762
04  2510 DATA32,210,255,96,169,2
    55,141,14,212,141,15,212,169
    ,128,141,18,2208
F9  2520 DATA212,141,24,212,173,
    27,212,141,168,2,96,32,145,1
    79,32,221,2017
FD  2530 DATA189,32,30,171,96,32
    ,244,26,205,18,24,176,248,24
    0,246,141,2118
03  2540 DATA169,2,32,244,26,201
    ,13,176,249,240,247,141,15,2
    4,160,0,1939
3C  2550 DATA140,171,2,173,171,2
    ,24,109,15,24,141,171,2,200,
    204,169,1718
2E  2560 DATA2,208,240,32,127,29
    ,76,114,25,5,83,79,82,82,89,
    32,1305
8D  2570 DATA89,79,85,32,72,65,8
    6,69,32,82,85,78,32,79,85,84
    ,1134
30  2580 DATA32,79,70,32,84,73,7
    7,69,0,5,87,72,65,84,32,73,9
    34
E1  2590 DATA83,32,84,72,69,32,6
    5,78,83,87,69,82,32,84,79,46
    ,1077
2E  2600 DATA46,0,29,5,32,32,32,
    32,32,84,72,69,32,65,78,83,7
    23
FB  2610 DATA87,69,82,32,73,83,4
    6,46,0,32,5,32,32,32,32,32,7
    15
6D  2620 DATA32,32,32,32,32,32,3
    2,32,32,32,32,32,32,32,32,32
    ,512
1B  2630 DATA32,32,32,32,32,32,3
    2,32,32,32,32,32,32,32,32,32
    ,512
6F  2640 DATA159,32,32,0,32,5,32
    ,32,32,32,32,32,32,32,32,32,
    580
CF  2650 DATA32,32,32,32,32,32,3
    2,32,32,32,32,32,32,32,32,32
    ,512
C7  2660 DATA32,32,32,32,32,32,3
    2,32,32,32,32,159,93,32,0,32
```

```
    ,668
AA  2670 DATA159,95,33,33,33,33,
    33,33,33,33,33,33,33,33,33,3
    3,716
6C  2680 DATA33,33,33,33,33,33,33,3
    3,33,33,33,33,33,33,33,33,33
    ,528
2A  2690 DATA33,33,33,33,33,33,33,9
    4,0,29,5,32,32,32,32,32,32,5
    18
DD  2700 DATA32,32,32,32,32,32,32,3
    2,32,32,32,32,32,32,32,32,32
    ,512
CB  2710 DATA32,32,32,32,32,32,32,3
    2,32,32,32,32,32,32,32,32,15
    9,639
DE  2720 DATA93,29,0,5,32,32,83,
    79,82,82,89,32,84,72,65,84,9
    43
52  2730 DATA32,65,78,83,87,69,8
    2,32,73,83,32,87,82,79,78,71
    ,1113
0B  2740 DATA32,0,5,32,32,32,87,
    69,76,76,32,68,79,78,69,46,8
    13
DF  2750 DATA46,46,46,89,79,85,3
    2,65,82,69,32,82,73,71,72,84
    ,1053
A8  2760 DATA32,0,159,19,17,13,0
    ,29,29,29,29,29,29,29,29,29,
    501
E9  2770 DATA29,29,29,29,32,32,1
    46,64,64,64,64,64,64,64,64,6
    4,902
E5  2780 DATA64,93,13,0,29,29,29
    ,29,29,29,29,29,29,29,29,29,
    518
42  2790 DATA29,32,32,146,95,33,
    33,33,33,33,33,33,33,33,94,1
    3,738
48  2800 DATA0,5,200,201,202,159
    ,40,17,157,157,157,157,5,203
    ,204,205,2069
97  2810 DATA159,41,17,157,157,1
    57,157,5,206,207,208,159,41,
    17,157,157,2002
C8  2820 DATA157,157,45,43,43,42
    ,0,5,210,211,212,159,40,17,1
    57,157,1655
52  2830 DATA157,157,5,213,214,2
    15,159,41,17,157,157,157,157
    ,5,216,217,2244
34  2840 DATA218,159,41,17,157,1
    57,157,157,45,43,43,42,0,5,2
    19,220,1680
4A  2850 DATA221,159,40,17,157,1
    57,157,157,5,255,223,160,159
    ,41,17,157,2082
48  2860 DATA157,157,157,5,161,1
    62,163,159,41,17,157,157,157
    ,157,45,43,1895
F8  2870 DATA43,42,0,5,164,165,1
    66,159,40,17,157,157,157,157
    ,5,167,1601
79  2880 DATA168,169,159,41,17,1
    57,157,157,157,5,170,171,172
    ,159,41,17,1917
8B  2890 DATA157,157,157,157,45,
    43,43,42,0,5,173,174,175,159
    ,40,17,1544
98  2900 DATA157,157,157,157,5,1
    76,177,178,159,41,17,157,157
    ,157,157,5,2014
46  2910 DATA179,180,181,159,41,
    17,157,157,157,157,45,43,43,
    42,0,162,1720
97  2920 DATA21,160,2,24,32,240,
    255,169,105,160,27,32,30,171
    ,32,199,1659
E6  2930 DATA26,96,100,148,205,1
    36,136,136,202,136,136,136,2
    04,136,204,205,2342
```

PROGRAM: LOADER.5

```
85  10 REM************************

13  20 REM*       LOADER.5       *

12  30 REM* OBJECT CODE PART 2 *

73  40 REM************************

F6  2000 FORL=0TO213:CX=0:FORD=0
    TO15:READA:CX=CX+A:POKE32768
    +L*16+D,A:NEXTD
82  2010 READA:IFA<>CXTHENPRINT"
    ERROR IN LINE";2040+(L*10):S
    TOP
0F  2020 NEXTL:END
D9  2040 DATA76,146,131,8,10,0,0
    ,172,188,2,169,0,133,251,169
    ,144,1599
BB  2050 DATA133,252,192,0,240,1
    6,24,165,251,105,80,133,251,
    165,252,105,2364
A7  2060 DATA0,133,252,136,208,2
    40,172,188,2,185,87,129,141,
    34,208,185,2300
B2  2070 DATA133,129,141,35,208,
    169,95,133,253,169,4,133,254
    ,169,95,133,2253
84  2080 DATA170,169,216,133,171
    ,173,3,128,141,6,128,169,54,
    133,1,160,1955
8B  2090 DATA0,177,251,145,253,1
    70,189,78,141,145,170,200,20
    4,4,128,208,2463
CE  2100 DATA240,206,6,128,240,4
    3,24,165,253,105,40,133,253,
    165,254,105,2360
13  2110 DATA0,133,254,24,165,17
    0,105,40,133,170,165,171,105
    ,0,133,171,1939
FF  2120 DATA24,165,251,109,4,12
    8,133,251,165,252,105,0,133,
    252,76,79,2127
B3  2130 DATA128,169,55,133,1,96
    ,169,26,141,24,208,173,22,20
    8,9,16,1578
40  2140 DATA141,22,208,160,0,14
    0,191,2,140,192,2,140,201,2,
    169,255,1965
9E  2150 DATA141,200,2,162,128,1
    85,1,129,157,78,141,200,232,
    224,214,208,2402
27  2160 DATA244,169,0,141,203,2
    ,141,206,2,141,205,2,141,207
    ,2,141,1947
B7  2170 DATA39,208,141,195,2,14
    1,196,2,141,197,2,141,198,2,
    160,0,1765
A5  2180 DATA169,1,153,224,134,2
    00,192,15,208,248,173,193,2,
    208,9,169,2298
37  2190 DATA30,141,219,137,141,
    221,137,96,169,52,141,221,13
    7,141,219,137,2339
4A  2200 DATA96,13,13,13,13,13,1
    3,13,13,13,13,15,15,15,15,15
    ,301
8F  2210 DATA15,15,15,15,15,15,1
    5,15,15,15,15,15,15,15,15,15
    ,240
A5  2220 DATA14,14,14,15,15,15,1
    5,15,13,13,14,14,14,14,13,13
    ,225
EE  2230 DATA13,13,13,13,13,15,1
    5,15,15,15,15,15,15,15,15,15
    ,230
8C  2240 DATA15,15,15,15,15,15,1
    5,15,15,15,15,14,14,13,13,13
    ,232
97  2250 DATA13,13,13,13,13,13,1
    3,8,8,8,8,8,8,8,8,8,163
DA  2260 DATA8,8,8,8,8,8,8,8,8,8
    ,8,8,8,8,11,131
85  2270 DATA11,11,11,11,11,11,1
    1,11,11,11,8,8,8,8,8,8,158
0C  2280 DATA8,8,8,8,11,13,13,13
    ,13,13,13,13,13,13,13,13,186

D9  2290 DATA13,13,13,13,13,13,1
    3,13,13,13,13,13,13,12,12,12
    ,205
59  2300 DATA12,12,12,12,12,12,1
    2,12,13,13,13,13,13,13,13,13
    ,200
06  2310 DATA13,13,12,173,200,2,
    48,3,32,144,135,173,191,2,20
    1,8,1350
55  2320 DATA208,17,173,192,2,20
    1,11,208,10,173,201,2,201,4,
    208,3,1814
C9  2330 DATA169,2,96,173,193,2,
    240,6,32,229,137,76,227,129,
    32,228,1971
42  2340 DATA255,240,251,201,83,
    208,15,32,179,136,32,224,130
    ,32,179,136,2333
51  2350 DATA32,224,130,76,44,13
    0,201,78,208,15,32,204,136,3
    2,185,130,1857
53  2360 DATA32,204,136,32,185,1
    30,76,44,130,201,87,208,15,3
    2,254,136,1902
50  2370 DATA32,7,131,32,254,136
    ,32,7,131,76,44,130,201,69,2
    08,12,1502
F8  2380 DATA32,229,136,32,56,13
    1,32,229,136,32,56,131,173,0
    ,208,201,1814
6D  2390 DATA142,240,76,201,204,
    240,101,173,1,208,201,66,240
    ,7,201,109,2410
F4  2400 DATA240,32,76,179,129,3
    2,53,141,206,192,2,32,128,13
    5,32,91,1700
99  2410 DATA137,185,110,137,141
    ,188,2,32,7,128,169,107,141,
    1,208,76,1769
65  2420 DATA107,135,32,53,141,2
    38,192,2,32,128,135,32,91,13
    7,185,110,1750
98  2430 DATA137,141,188,2,32,7,
    128,169,68,141,1,208,76,107,
    135,32,1572
17  2440 DATA53,141,206,191,2,32
    ,128,135,32,91,137,185,110,1
    37,141,188,1909
59  2450 DATA2,32,7,128,169,200,
    141,0,208,76,107,135,32,53,1
    41,238,1669
E7  2460 DATA191,2,32,128,135,32
    ,91,137,185,110,137,141,188,
    2,32,7,1550
31  2470 DATA128,169,144,141,0,2
    08,76,107,135,173,0,208,141,
    189,2,173,1994
38  2480 DATA1,208,141,190,2,206
    ,190,2,32,23,137,160,0,177,1
    80,32,1681
D7  2490 DATA108,131,240,11,200,
    177,180,32,108,131,240,3,206
    ,1,208,96,2072
81  2500 DATA173,0,208,141,189,2
    ,173,1,208,24,105,21,141,190
    ,2,32,1610
D0  2510 DATA23,137,160,0,177,18
    0,32,108,131,240,11,200,177,
    180,32,108,1896
74  2520 DATA131,240,3,238,1,208
    ,96,173,1,208,141,190,2,173,
```

```
    0,208,2013
97  2530 DATA141,189,2,238,189,2
    ,32,23,137,160,0,177,180,32,
    108,131,1741
BF  2540 DATA240,21,160,40,177,1
    80,32,108,131,240,12,160,80,
    177,180,32,1970
E2  2550 DATA108,131,240,3,206,0
    ,208,96,173,1,208,141,190,2,
    173,0,1880
42  2560 DATA208,24,105,19,141,1
    89,2,238,189,2,32,23,137,160
    ,0,177,1646
6D  2570 DATA180,32,108,131,240,
    21,160,40,177,180,32,108,131
    ,240,12,160,1952
06  2580 DATA80,177,180,32,108,1
    31,240,3,238,0,208,96,201,13
    7,240,31,2102
9A  2590 DATA201,136,240,27,201,
    162,240,23,201,167,240,19,20
    1,168,240,15,2481
CB  2600 DATA201,163,240,11,201,
    146,240,7,201,147,240,3,169,
    0,96,169,2234
19  2610 DATA255,96,32,39,132,32
    ,150,128,169,128,141,138,2,3
    2,0,24,1498
9D  2620 DATA162,1,160,30,24,32,
    240,255,169,168,160,139,32,3
    0,171,32,1805
80  2630 DATA91,137,185,110,137,
    141,188,2,32,7,128,169,192,1
    41,248,7,1915
D7  2640 DATA169,170,141,0,208,1
    69,90,141,1,208,173,21,208,9
    ,1,141,1850
3B  2650 DATA21,208,32,179,129,2
    01,2,208,15,160,3,162,13,24,
    32,240,1629
52  2660 DATA255,169,44,160,140,
    32,30,171,160,6,162,16,24,32
    ,240,255,1896
85  2670 DATA169,115,160,140,32,
    30,171,172,207,2,32,66,141,1
    69,129,160,1895
6E  2680 DATA140,32,30,171,160,3
    ,162,18,24,32,240,255,169,13
    9,160,140,1875
61  2690 DATA32,30,171,172,205,2
    ,32,66,141,169,148,160,140,3
    2,30,171,1701
32  2700 DATA172,206,2,32,66,141
    ,96,169,0,141,32,208,141,33,
    208,169,1816
96  2710 DATA147,32,210,255,162,
    5,160,7,24,32,240,255,169,40
    ,160,138,2036
95  2720 DATA32,30,171,162,7,160
    ,8,24,32,240,255,169,67,160,
    138,32,1687
FE  2730 DATA30,171,162,9,160,7,
    24,32,240,255,169,93,160,138
    ,32,30,1712
9E  2740 DATA171,162,20,160,9,24
    ,32,240,255,169,121,160,138,
    32,30,171,1894
ED  2750 DATA32,228,255,208,19,1
    60,0,238,194,2,173,194,2,153
    ,218,216,2292
44  2760 DATA200,192,14,208,248,
    76,112,132,169,145,160,138,3
    2,30,171,32,2059
AE  2770 DATA228,255,240,251,201
    ,49,144,247,201,54,176,243,5
    6,233,48,168,2794
73  2780 DATA136,185,46,135,141,
    18,24,185,62,135,141,17,24,1
    41,199,2,1591
9C  2790 DATA169,182,160,138,32,
    30,171,162,3,160,13,24,32,24
    0,255,169,1940
5D  2800 DATA211,160,138,32,30,1
    71,162,4,160,13,24,32,240,25
    5,169,221,2022
F2  2810 DATA160,138,32,30,171,1
    62,5,160,13,24,32,240,255,16
    9,231,160,1982
F2  2820 DATA138,32,30,171,162,6
    ,160,13,24,32,240,255,169,24
    4,160,138,1974
67  2830 DATA32,30,171,162,14,16
    0,14,24,32,240,255,169,0,160
    ,139,32,1634
E3  2840 DATA30,171,32,228,255,2
    40,251,201,49,144,247,201,53
    ,176,243,32,2553
01  2850 DATA210,255,56,233,49,1
    41,178,2,162,15,160,14,24,32
    ,240,255,2026
7A  2860 DATA169,13,160,139,32,3
    0,171,32,228,255,240,251,201
    ,49,144,247,2361
97  2870 DATA201,53,176,243,141,
    194,2,56,233,49,205,178,2,24
    0,232,141,2346
D7  2880 DATA179,2,173,194,2,32,
    210,255,169,26,160,139,32,30
    ,171,32,1806
B1  2890 DATA228,255,240,251,201
    ,74,240,12,201,75,208,243,16
    9,0,141,193,2731
5C  2900 DATA2,76,105,133,169,1,
    141,193,2,169,147,32,210,255
    ,162,12,1809
8F  2910 DATA160,6,24,32,240,255
    ,169,94,160,139,32,30,171,16
    9,4,32,1717
A2  2920 DATA31,141,96,173,200,2
    ,168,24,105,212,141,249,7,18
    5,235,133,2102
23  2930 DATA141,37,208,185,250,
    133,141,40,208,185,9,134,141
    ,38,208,185,2243
EB  2940 DATA209,134,141,28,208,
    185,239,134,141,23,208,185,2
    54,134,141,29,2393
51  2950 DATA208,185,13,135,141,
    2,208,185,30,135,141,3,208,1
    73,21,208,1996
A4  2960 DATA9,2,141,21,208,140,
    194,2,162,13,160,3,24,32,240
    ,255,1606
9D  2970 DATA169,123,160,139,32,
    30,171,174,194,2,224,11,144,
    2,162,11,1748
CC  2980 DATA189,36,134,168,189,
    24,134,32,30,171,96,2,4,7,14
    ,14,1244
36  2990 DATA12,12,12,6,8,8,0,0,
    0,0,2,6,2,6,1,11,86
FB  3000 DATA9,9,10,10,10,0,0,0,
    0,7,1,1,1,1,1,1,61
D9  3010 DATA8,9,9,9,0,0,0,0,48,
    58,65,80,88,103,115,125,717
EC  3020 DATA134,143,151,160,134
    ,134,134,134,134,134,134,134
    ,134,134,134,134,2196
CB  3030 DATA65,32,80,72,79,69,7
    8,73,88,0,65,32,66,76,79,66,
    1020
DC  3040 DATA0,69,78,67,72,65,78
    ,84,69,68,32,70,73,82,69,0,9
    76
38  3050 DATA65,32,83,78,65,75,6
    9,0,65,32,77,89,83,84,73,67,
    1037
F8  3060 DATA32,67,76,79,85,68,0
    ,65,32,87,72,73,82,76,87,73,
    1054
44  3070 DATA78,68,0,65,32,83,79
    ,76,68,73,69,82,0,65,78,32,9
    48
30  3080 DATA69,65,71,76,69,0,65
    ,32,87,73,90,65,82,68,0,65,9
    77
87  3090 DATA32,71,78,79,77,69,0
    ,65,32,90,79,77,66,73,69,0,9
    57
21  3100 DATA65,32,80,73,69,67,6
    9,32,79,70,32,84,72,69,32,75
    ,1000
51  3110 DATA69,89,0,6,4,8,3,3,1
    ,2,4,0,6,0,0,3,198
24  3120 DATA8,0,11,4,9,5,8,11,0
    ,11,2,2,10,3,7,8,99
BC  3130 DATA11,0,2,2,2,0,2,2,0,
    2,2,2,0,0,0,0,27
1A  3140 DATA1,1,1,1,1,1,1,1,1,1
    ,1,1,1,1,1,2,17
04  3150 DATA0,2,2,2,2,2,0,2,0,2
    ,0,0,0,0,0,0,14
30  3160 DATA2,0,2,2,0,0,0,0,0,0
    ,0,0,0,170,170,164,510
F1  3170 DATA172,160,160,170,170
    ,170,170,170,170,170,170,170
    ,170,170,80,88,2530
79  3180 DATA80,84,80,80,80,80,8
    0,80,80,80,90,84,84,84,3,6,1
    155
BB  3190 DATA8,10,13,5,3,3,3,3,3
    ,3,3,5,3,3,60,54,182
AA  3200 DATA48,42,36,160,255,14
    0,200,2,185,179,134,205,191,
    2,208,11,1998
B1  3210 DATA185,194,134,205,192
    ,2,208,3,76,97,135,200,192,1
    5,208,232,2278
14  3220 DATA96,170,185,224,134,
    240,3,140,200,2,96,169,1,141
    ,21,208,2030
08  3230 DATA32,67,135,173,200,2
    ,201,255,240,3,32,131,133,76
    ,179,129,1988
89  3240 DATA162,13,160,3,24,32,
    240,255,169,133,160,139,32,3
    0,171,96,1819
88  3250 DATA173,200,2,201,11,14
    4,58,238,201,2,168,169,0,153
    ,224,134,2078
00  3260 DATA173,201,2,24,105,48
    ,141,117,4,169,2,32,31,141,3
    2,128,1350
A9  3270 DATA135,32,212,140,169,
    255,141,200,2,162,13,160,3,2
    4,32,240,1920
2B  3280 DATA255,169,199,160,139
    ,32,30,171,169,3,32,31,141,3
    2,128,135,1826
10  3290 DATA96,162,14,160,3,24,
    32,240,255,169,234,160,139,3
    2,30,171,1921
76  3300 DATA172,200,2,185,51,13
    5,141,202,2,24,105,48,32,210
    ,255,169,1933
64  3310 DATA31,160,140,32,30,17
    1,169,0,141,203,2,141,204,2,
    173,202,1801
E3  3320 DATA2,24,109,206,2,141,
    206,2,32,3,24,32,9,24,173,17
    5,1164
FB  3330 DATA2,240,6,238,204,2,7
    6,28,136,238,203,2,169,2,32,
    31,1609
48  3340 DATA141,206,202,2,208,2
    26,173,205,2,24,109,203,2,14
    1,205,2,2051
C6  3350 DATA173,203,2,205,204,2
    ,144,49,32,212,140,238,207,2
    ,172,200,2185
70  3360 DATA2,169,0,153,224,134
    ,169,255,141,200,2,32,3,24,3
    2,6,1546
30  3370 DATA24,162,13,160,10,24
```

```
     ,32,240,255,169,167,160,140,
     32,30,171,1789
AC   3380 DATA169,3,32,31,141,32,
     6,24,96,32,3,24,32,6,24,173,
     828
BF   3390 DATA208,2,141,191,2,173
     ,209,2,141,192,2,32,91,137,1
     85,110,1818
20   3400 DATA137,141,188,2,32,7,
     128,169,1,141,21,208,169,170
     ,141,0,1655
07   3410 DATA208,169,90,141,1,20
     8,169,255,141,200,2,162,13,1
     60,10,24,1953
8C   3420 DATA32,240,255,169,189,
     160,140,32,30,171,169,3,32,3
     1,141,32,1826
49   3430 DATA6,24,96,238,195,2,1
     72,195,2,192,5,208,5,160,0,1
     40,1640
3A   3440 DATA195,2,185,20,138,14
     1,248,7,32,218,137,96,238,19
     7,2,172,2028
DD   3450 DATA197,2,192,5,208,5,1
     60,0,140,197,2,185,25,138,14
     1,248,1845
94   3460 DATA7,32,218,137,96,238
     ,196,2,172,196,2,192,5,208,5
     ,160,1866
F4   3470 DATA0,140,196,2,185,30,
     138,141,248,7,32,218,137,96,
     238,198,2006
B3   3480 DATA2,172,198,2,192,5,2
     08,5,160,0,140,198,2,185,35,
     138,1642
F9   3490 DATA141,248,7,32,218,13
     7,96,173,189,2,56,233,24,74,
     74,74,1778
F4   3500 DATA141,189,2,173,190,2
     ,56,233,50,74,74,74,141,190,
     2,169,1760
E7   3510 DATA0,133,180,169,4,133
     ,181,172,190,2,240,16,24,165
     ,180,105,1894
5D   3520 DATA40,133,180,165,181,
     105,0,133,181,136,208,240,24
     ,165,180,109,2180
F4   3530 DATA189,2,133,180,165,1
     81,105,0,133,181,96,169,0,17
     2,192,2,1900
B7   3540 DATA240,6,24,105,9,136,
     208,250,24,109,191,2,168,96,
     0,1,1569
3C   3550 DATA8,8,8,5,6,8,5,3,4,2
     ,10,11,9,10,11,19,127
FB   3560 DATA6,8,8,11,19,14,18,2
     1,19,12,17,21,15,17,20,20,24
     6
91   3570 DATA21,19,37,38,38,38,3
     5,38,38,38,36,39,40,40,40,41
     ,576
AE   3580 DATA40,40,40,42,17,18,2
     1,18,21,18,21,18,19,17,16,15
     ,381
BE   3590 DATA0,13,22,21,16,15,10
     ,8,4,7,21,43,44,24,24,10,282

95   3600 DATA11,4,8,21,20,21,32,
     27,17,21,16,21,32,32,32,27,3
     42
FB   3610 DATA34,14,29,28,29,29,2
     9,45,33,34,162,150,160,150,1
     36,208,1270
9F   3620 DATA253,202,208,248,96,
     173,0,220,41,15,141,194,2,56
     ,169,15,2033
21   3630 DATA237,194,2,240,240,2
     01,1,208,3,169,78,96,201,2,2
     08,3,2083
3D   3640 DATA169,83,96,201,4,208
     ,3,169,87,96,201,8,208,3,169
     ,69,1774
CB   3650 DATA96,76,229,137,194,1
     95,196,192,193,199,200,201,1
     97,198,204,205,2912
9D   3660 DATA206,202,203,209,210
     ,211,207,208,5,87,69,76,67,7
     9,77,69,2185
6C   3670 DATA32,84,79,32,65,67,7
     5,82,79,89,68,39,83,32,83,65
     ,1054
66   3680 DATA71,65,0,158,65,78,3
     2,69,68,85,67,65,84,73,79,78
     ,1137
06   3690 DATA65,76,32,65,68,86,6
     9,78,84,85,82,69,0,155,66,89
     ,1169
BC   3700 DATA32,65,76,76,69,78,3
     2,65,78,68,32,77,65,82,71,65
     ,1031
06   3710 DATA82,69,84,32,87,69,6
     6,66,0,5,80,82,69,83,83,32,9
     89
B3   3720 DATA65,78,89,32,75,69,8
     9,32,84,79,32,83,84,65,82,84
     ,1122
E4   3730 DATA0,147,5,67,72,79,79
     ,83,69,32,68,73,70,70,73,67,
     1054
CD   3740 DATA85,76,84,89,32,40,4
     9,61,69,65,83,89,32,32,53,61
     ,1000
CE   3750 DATA72,65,82,68,41,0,14
     7,5,80,76,69,65,83,69,32,67,
     1021
C4   3760 DATA72,79,79,83,69,32,8
     9,79,85,82,32,87,69,65,80,79
     ,1161
20   3770 DATA78,83,0,49,46,32,32
     ,32,32,65,88,69,0,50,46,32,7
     34
9F   3780 DATA32,32,32,66,79,87,0
     ,51,46,32,32,32,32,83,72,73,
     781
49   3790 DATA69,76,68,0,52,46,32
     ,32,32,32,83,87,79,82,68,0,8
     38
30   3800 DATA158,87,69,65,80,79,
     78,32,49,63,5,32,0,158,87,69
     ,1111
8D   3810 DATA65,80,79,78,32,50,6
     3,5,32,0,147,5,80,76,69,65,9
     26
66   3820 DATA83,69,32,67,72,79,7
     9,83,69,32,67,79,78,84,82,79
     ,1134
52   3830 DATA76,32,77,69,84,72,7
     9,68,58,13,18,158,75,146,46,
     46,1117
0C   3840 DATA46,46,5,75,69,89,66
     ,79,65,82,68,13,18,158,74,14
     6,1099
B3   3850 DATA46,46,46,46,5,74,79
     ,89,83,84,73,67,75,0,5,71,88
     9
67   3860 DATA79,79,68,32,76,85,6
     7,75,32,65,78,68,32,72,65,80
     ,1053
7C   3870 DATA80,89,32,72,85,78,8
     4,73,78,71,0,5,89,79,85,32,1
     032
D3   3880 DATA83,69,69,32,0,5,32,
     32,32,32,32,32,32,32,32,32,5
     78
F8   3890 DATA32,32,32,32,32,32,3
     2,32,32,32,32,32,32,32,32,32
     ,512
24   3900 DATA32,32,32,32,32,32,3
     2,0,159,75,69,89,32,80,65,82
     ,875
C9   3910 DATA84,83,32,17,157,157
     ,157,157,157,157,157,157,157
     ,157,70,79,1935
80   3920 DATA85,78,68,58,32,48,0
     ,5,87,73,84,72,32,65,32,70,8
     89
50   3930 DATA76,65,83,72,32,79,7
     0,32,76,73,71,72,84,32,73,84
     ,1074
98   3940 DATA32,86,65,78,73,83,7
     2,69,83,0,5,79,72,32,68,69,9
     66
3A   3950 DATA65,82,32,32,89,79,8
     5,32,87,73,76,76,32,72,65,86
     ,1063
D1   3960 DATA69,32,84,79,32,70,7
     3,71,72,84,13,29,29,29,89,79
     ,934
A3   3970 DATA85,32,77,85,83,84,3
     2,65,78,83,87,69,82,32,0,32,
     1006
F4   3980 DATA83,85,77,83,32,84,7
     9,32,87,73,78,0,5,84,72,69,1
     023
31   3990 DATA32,75,69,89,32,80,6
     5,82,84,83,32,77,65,71,73,67
     ,1076
14   4000 DATA65,76,76,89,32,74,7
     9,73,78,46,32,89,79,85,13,29
     ,1015
D2   4010 DATA29,29,29,32,65,82,6
     9,32,82,69,65,68,89,32,84,79
     ,935
E8   4020 DATA32,69,78,84,69,82,3
     2,84,72,69,32,67,65,83,84,76
     ,1078
C4   4030 DATA69,13,0,29,29,29,89
     ,79,85,32,75,73,76,76,69,68,
     891
C1   4040 DATA0,32,78,65,83,84,73
     ,69,83,13,0,29,65,78,68,32,8
     52
00   4050 DATA71,79,84,0,32,83,85
     ,77,83,32,82,73,71,72,84,32,
     1040
2B   4060 DATA79,85,84,32,79,70,0
     ,5,87,69,76,76,32,68,79,78,9
     99
67   4070 DATA69,46,46,46,46,89,7
     9,85,32,87,79,78,0,5,66,69,9
     22
14   4080 DATA84,84,69,82,32,76,8
     5,67,75,32,78,69,88,84,32,84
     ,1121
02   4090 DATA73,77,69,0,169,230,
     141,249,7,173,2,208,56,233,8
     ,141,1836
AC   4100 DATA2,208,173,3,208,56,
     233,4,141,3,208,169,2,141,29
     ,208,1788
49   4110 DATA141,23,208,169,0,14
     1,28,208,32,17,141,173,249,7
     ,201,227,1965
74   4120 DATA240,6,206,249,7,76,
     248,140,173,21,208,41,253,14
     1,21,208,2238
F1   4130 DATA96,162,150,160,150,
     136,208,253,238,40,208,202,2
     08,245,96,141,2693
85   4140 DATA194,2,169,0,133,162
     ,165,162,201,60,208,250,206,
     194,2,240,2348
5D   4150 DATA3,76,34,141,96,173,
     191,2,141,208,2,173,192,2,14
     1,209,1784
7B   4160 DATA2,96,169,0,32,145,1
     79,32,221,189,32,30,171,96,0
     ,136,1530
5A   4170 DATA137,206,136,136,136
     ,137,136,137,137,136,137,137
     ,204,205,136,136,2389
```

PROGRAM: LOADER.6

```
85  10 REM************
BC  20 REM* LOADER.6 *
D3  30 REM*   MAP    *
BF  40 REM************
56  2000 FORL=0TO230:CX=0:FORD=0
    TO15:READA:CX=CX+A:POKE36864
    +L*16+D,A:NEXTD
82  2010 READA:IFA<>CXTHENPRINT"
    ERROR IN LINE";2040+(L*10):S
    TOP
0F  2020 NEXTL:END
E7  2040 DATA148,128,129,130,136
    ,134,135,136,128,129,137,131
    ,132,133,136,136,2138
0E  2050 DATA137,137,131,132,137
    ,134,135,137,136,137,204,205
    ,134,135,137,136,2304
D3  2060 DATA137,137,136,137,136
    ,137,137,137,204,205,137,136
    ,137,136,137,173,2359
2A  2070 DATA179,175,179,175,136
    ,136,137,136,137,176,177,178
    ,177,178,136,136,2548
A4  2080 DATA137,137,136,136,137
    ,204,136,204,205,137,137,136
    ,136,128,129,130,2365
23  2090 DATA136,136,131,132,133
    ,178,136,204,205,136,130,137
    ,134,135,136,136,2335
57  2100 DATA136,136,173,179,133
    ,136,136,137,137,137,136,136
    ,176,177,136,204,2405
3E  2110 DATA205,136,137,136,137
    ,137,137,136,136,136,137,137
    ,136,136,136,137,2252
9A  2120 DATA136,136,128,129,130
    ,136,136,137,136,136,136,136
    ,131,132,133,136,2144
64  2130 DATA136,173,179,175,136
    ,128,134,135,136,204,205,176
    ,177,178,136,131,2539
27  2140 DATA173,179,175,136,136
    ,136,136,128,129,130,176,177
    ,178,137,137,137,2400
38  2150 DATA136,131,132,133,136
    ,136,136,136,136,136,136,134
    ,135,136,136,136,2161
34  2160 DATA137,136,136,136,137
    ,137,136,136,136,137,137,137
    ,137,136,204,205,2320
D5  2170 DATA204,205,136,136,136
    ,136,136,136,137,204,205,136
    ,175,204,205,128,2619
0E  2180 DATA129,130,136,136,173
    ,179,178,136,136,131,132,133
    ,137,136,176,177,2355
79  2190 DATA204,205,136,204,137
    ,137,136,137,176,177,136,204
    ,205,136,137,137,2604
69  2200 DATA137,136,137,204,173
    ,175,136,136,136,137,137,137
    ,136,137,176,178,2408
7D  2210 DATA204,205,137,136,137
    ,137,137,137,204,205,136,204
    ,205,137,136,136,2593
9A  2220 DATA137,137,137,137,204
    ,205,137,128,129,130,204,205
    ,137,202,203,203,2635
13  2230 DATA202,131,132,133,137
    ,173,202,202,203,202,137,134
    ,135,136,137,176,2572
BB  2240 DATA175,134,135,137,136
    ,176,177,178,136,137,178,137
    ,136,204,205,136,2517
64  2250 DATA136,136,204,205,137
    ,136,136,137,137,137,136,136
    ,137,137,137,137,2321
BE  2260 DATA137,137,136,136,136
    ,137,136,137,137,136,136,137
    ,137,136,136,137,2184
8C  2270 DATA137,137,179,175,137
    ,128,129,130,137,136,136,137
    ,177,178,136,131,2320
B9  2280 DATA132,133,204,205,136
    ,137,136,137,137,134,135,136
    ,137,128,129,130,2286
ED  2290 DATA136,136,137,131,132
    ,133,128,129,130,136,173,179
    ,175,134,135,136,2260
25  2300 DATA131,132,133,136,176
    ,177,178,136,137,137,134,135
    ,136,136,136,136,2286
35  2310 DATA136,136,136,204,205
    ,136,204,205,136,137,137,137
    ,136,136,137,137,2455
70  2320 DATA136,128,136,136,136
    ,136,136,136,204,205,136,131
    ,136,137,137,137,2303
75  2330 DATA136,136,136,137,137
    ,134,204,205,136,136,137,137
    ,137,173,179,175,2435
A0  2340 DATA205,136,136,137,137
    ,131,132,133,137,137,136,173
    ,179,175,136,134,2354
32  2350 DATA135,136,204,205,137
    ,176,177,178,137,136,136,137
    ,137,137,137,137,2442
CB  2360 DATA136,136,136,137,137
    ,136,136,137,173,175,137,137
    ,136,136,137,137,2259
42  2370 DATA136,137,176,178,136
    ,136,137,137,137,136,137,137
    ,136,137,137,137,2267
84  2380 DATA136,136,173,179,175
    ,136,204,205,137,136,136,136
    ,176,177,178,205,2625
46  2390 DATA131,132,133,137,136
    ,136,137,137,173,175,134,135
    ,204,205,137,137,2379
58  2400 DATA137,136,176,178,137
    ,137,136,136,136,136,137,136
    ,137,137,136,136,2264
65  2410 DATA137,137,137,137,137
    ,136,136,137,137,137,137,137
    ,136,136,136,137,2187
A2  2420 DATA137,137,137,136,136
    ,136,137,136,137,128,129,130
    ,137,173,179,175,2280
22  2430 DATA204,205,137,131,132
    ,133,137,176,177,178,137,136
    ,136,134,135,137,2425
C2  2440 DATA134,135,136,173,179
    ,175,136,137,131,132,136,136
    ,136,176,177,178,2407
78  2450 DATA204,205,134,135,136
    ,136,137,137,137,136,136,136
    ,136,137,136,136,2314
BB  2460 DATA137,137,137,137,136
    ,136,136,136,136,136,136,136
    ,136,136,137,137,2182
13  2470 DATA136,137,136,137,137
    ,137,137,137,136,136,136,137
    ,137,204,205,136,2321
BF  2480 DATA137,136,136,202,203
    ,203,205,137,137,137,137,136
    ,137,137,203,202,2585
FB  2490 DATA173,179,175,136,136
    ,136,137,137,173,179,176,177
    ,178,137,136,136,2501
F6  2500 DATA136,136,176,177,136
    ,137,204,205,136,137,137,136
    ,137,136,136,136,2398
F0  2510 DATA136,137,137,136,136
    ,128,129,130,136,137,137,137
    ,137,136,137,131,2157
67  2520 DATA132,133,136,136,136
    ,136,136,136,136,134,135,136
    ,179,175,137,137,2250
5E  2530 DATA136,137,137,137,128
    ,129,177,178,136,136,137,137
    ,136,136,131,132,2240
85  2540 DATA131,132,133,137,136
    ,137,137,137,202,203,134,135
    ,136,136,136,137,2299
99  2550 DATA136,202,203,204,128
    ,129,130,136,136,136,137,136
    ,136,136,131,132,2348
7B  2560 DATA133,136,136,137,136
    ,137,136,136,134,135,137,137
    ,136,136,136,136,2174
F5  2570 DATA136,136,136,204,205
    ,136,136,136,136,137,137,136
    ,179,175,137,137,2399
AE  2580 DATA137,136,204,205,204
    ,205,177,178,136,136,137,137
    ,137,173,179,175,2656
C9  2590 DATA131,132,133,137,136
    ,136,136,137,173,179,134,135
    ,136,136,137,137,2245
03  2600 DATA137,136,176,177,137
    ,137,136,137,137,137,136,136
    ,137,137,136,137,2266
4A  2610 DATA137,137,136,137,137
    ,137,137,137,137,136,137,137
    ,136,137,137,137,2189
4C  2620 DATA136,137,137,136,137
    ,137,136,136,136,137,137,137
    ,204,205,204,205,2457
4A  2630 DATA137,137,136,136,128
    ,129,137,204,205,136,136,137
    ,137,137,131,132,2295
46  2640 DATA209,210,207,136,136
    ,136,136,207,207,209,207,137
    ,137,137,137,136,2684
F4  2650 DATA137,136,136,210,136
    ,136,136,136,136,136,136,136
    ,136,206,207,136,2392
76  2660 DATA136,136,137,137,137
    ,136,136,137,207,207,136,136
    ,136,136,136,210,2396
AF  2670 DATA209,206,209,210,206
    ,137,136,136,136,137,137,209
    ,204,205,136,204,2817
D8  2680 DATA205,137,137,204,205
    ,136,136,204,205,136,204,205
    ,136,136,136,136,2658
02  2690 DATA202,202,203,137,136
    ,137,137,206,207,137,203,203
    ,136,136,137,137,2656
E7  2700 DATA136,136,137,209,202
    ,203,137,136,137,136,136,136
    ,136,210,137,203,2527
F4  2710 DATA202,137,136,136,136
    ,137,137,207,202,137,136,137
    ,137,137,136,136,2386
4A  2720 DATA136,206,203,136,136
    ,136,136,137,137,137,137,137
    ,203,202,137,137,2453
28  2730 DATA136,136,136,136,210
    ,207,203,137,202,137,137,137
    ,137,209,136,137,2533
8A  2740 DATA176,177,178,137,136
    ,136,136,136,173,179,206,207
    ,136,136,136,137,2522
6A  2750 DATA137,137,176,177,209
    ,210,136,137,137,137,136,136
    ,136,137,207,136,2481
44  2760 DATA136,136,136,136,136
    ,137,136,136,136,209,136,136
    ,137,137,136,136,2252
F7  2770 DATA136,136,136,137,137
    ,137,136,136,137,136,137,136
    ,204,205,136,137,2319
B3  2780 DATA136,136,137,137,207
    ,206,204,137,204,137,207,209
    ,204,136,136,136,2669
20  2790 DATA206,209,137,136,136
    ,137,136,202,203,202,210,136
    ,136,137,137,137,2597
59  2800 DATA136,136,203,203,136
```

```
     ,136,136,136,136,136,136,203
     ,202,203,136,136,2510
C1   2810 DATA137,136,136,137,136
     ,136,136,203,136,136,136,136
     ,136,136,202,137,2312
38   2820 DATA203,136,202,137,137
     ,136,136,137,137,203,202,202
     ,136,203,136,136,2579
8E   2830 DATA136,136,202,137,137
     ,136,136,136,136,203,202,137
     ,136,136,136,136,2378
F6   2840 DATA137,137,136,136,128
     ,129,130,137,207,206,204,205
     ,136,137,131,132,2428
4B   2850 DATA133,209,210,137,137
     ,137,136,137,134,135,136,136
     ,136,207,137,137,2394
07   2860 DATA137,137,136,137,136
     ,137,137,137,137,136,137,137
     ,136,137,136,136,2186
17   2870 DATA137,137,209,136,136
     ,137,137,136,136,137,137,137
     ,207,210,137,137,2403
EE   2880 DATA136,137,137,136,207
     ,206,207,209,206,136,207,209
     ,210,209,209,137,2898
45   2890 DATA202,137,202,136,136
     ,136,137,204,205,136,203,202
     ,135,136,137,136,2581
C5   2900 DATA136,137,204,205,136
     ,202,203,137,137,137,136,136
     ,137,136,136,136,2451
14   2910 DATA202,136,136,136,136
     ,136,137,136,136,203,136,136
     ,136,137,136,136,2311
C1   2920 DATA137,136,136,202,136
     ,136,136,137,137,137,137,204
     ,136,203,137,137,2384
F5   2930 DATA137,137,136,204,205
     ,136,136,136,202,136,136,136
     ,204,136,204,205,2586
D9   2940 DATA206,209,207,137,136
     ,136,137,207,206,209,210,207
     ,136,136,137,137,2753
FE   2950 DATA136,137,137,210,136
     ,136,136,137,137,137,136,136
     ,137,137,137,136,2258
A3   2960 DATA137,136,136,137,137
     ,137,137,137,137,137,137,137
     ,136,137,137,136,2188
3C   2970 DATA137,137,207,136,137
     ,136,204,205,136,136,137,207
     ,207,207,137,137,2603
0D   2980 DATA173,179,175,137,207
     ,207,137,137,204,205,176,177
     ,178,137,204,205,2838
B2   2990 DATA207,206,210,137,137
     ,137,137,137,207,137,209,137
     ,137,137,137,137,2546
BE   3000 DATA137,137,137,207,137
     ,137,137,137,137,137,137,137
     ,137,207,137,137,2332
35   3010 DATA137,137,137,137,173
     ,175,137,137,137,137,137,137
     ,137,137,176,178,2346
7A   3020 DATA173,179,137,137,137
     ,137,137,137,137,137,176,177
     ,203,202,137,137,2480
64   3030 DATA137,137,137,137,204
     ,205,202,137,203,137,137,137
     ,137,204,205,137,2593
35   3040 DATA137,137,202,207,207
     ,207,207,207,207,207,209,137
     ,137,203,202,207,3020
D9   3050 DATA207,203,202,203,137
     ,136,137,137,137,203,202,137
     ,137,137,137,136,2588
93   3060 DATA137,137,137,136,136
     ,136,136,137,136,137,137,136
     ,136,137,137,137,2185
27   3070 DATA136,137,137,136,137
     ,137,136,137,137,136,137,136
     ,209,137,136,137,2258
0B   3080 DATA137,136,136,137,137
     ,206,210,207,137,137,136,137
     ,137,207,207,209,2613
5A   3090 DATA204,205,136,136,136
     ,136,136,204,205,136,205,136
     ,204,136,136,136,2587
1B   3100 DATA136,136,136,204,207
     ,136,136,136,136,136,136,136
     ,136,136,136,136,2315
7F   3110 DATA136,136,136,136,136
     ,136,136,136,136,136,136,136
     ,136,136,136,136,2176
F7   3120 DATA136,136,136,136,136
     ,136,136,136,136,136,136,136
     ,209,136,136,136,2249
E4   3130 DATA136,136,136,207,206
     ,206,206,209,210,136,136,136
     ,137,210,209,210,2826
11   3140 DATA210,209,206,207,207
     ,207,209,210,206,209,206,209
     ,206,207,136,137,3181
53   3150 DATA136,207,209,210,206
     ,207,207,136,136,136,136,137
     ,207,207,207,207,2891
43   3160 DATA136,136,137,137,136
     ,136,136,137,136,136,136,136
     ,136,136,136,136,2179
DC   3170 DATA136,136,207,136,136
     ,137,136,136,137,136,136,136
     ,206,136,137,137,2321
E4   3180 DATA137,136,136,136,209
     ,210,210,206,209,137,136,136
     ,136,207,210,206,2757
4A   3190 DATA136,203,202,203,136
     ,137,137,136,207,207,202,137
     ,136,202,203,203,2787
1E   3200 DATA202,137,137,207,137
     ,137,137,137,136,137,202,203
     ,137,137,137,137,2457
3A   3210 DATA136,137,136,137,203
     ,202,137,137,137,137,137,137
     ,137,137,137,202,2386
AC   3220 DATA136,137,137,137,136
     ,136,136,136,203,137,137,137
     ,202,203,137,137,2384
54   3230 DATA137,137,136,202,203
     ,137,137,203,137,136,137,137
     ,137,203,136,137,2452
8D   3240 DATA148,149,150,147,151
     ,152,180,181,146,146,146,151
     ,152,153,154,146,2452
53   3250 DATA182,183,180,181,146
     ,155,156,158,147,147,147,146
     ,182,183,146,146,2585
E7   3260 DATA146,146,146,146,146
     ,147,146,146,181,146,147,146
     ,147,147,146,147,2376
E7   3270 DATA146,180,183,146,147
     ,146,146,146,146,146,146,182
     ,146,146,146,146,2444
A7   3280 DATA146,147,146,147,146
     ,146,148,149,150,147,147,147
     ,146,180,181,146,2419
CD   3290 DATA151,152,153,154,147
     ,147,147,147,151,152,155,156
     ,157,158,148,149,2424
C0   3300 DATA150,146,155,156,147
     ,146,147,147,146,146,146,147
     ,147,147,148,149,2370
FC   3310 DATA150,146,147,147,147
     ,146,146,147,147,147,147,147
     ,147,147,147,147,2352
EF   3320 DATA147,147,151,152,146
     ,146,147,146,147,147,146,147
     ,155,156,147,147,2374
1D   3330 DATA147,147,147,147,180
     ,181,147,148,149,147,146,147
     ,146,146,182,183,2490
EC   3340 DATA146,180,181,146,146
     ,147,146,146,182,183,146,182
     ,183,147,147,146,2554
56   3350 DATA146,147,147,146,181
     ,146,146,146,147,147,147,147
     ,146,180,183,147,2449
80   3360 DATA146,146,146,146,146
     ,146,146,182,146,146,146,147
     ,147,147,146,147,2376
2B   3370 DATA146,146,180,181,147
     ,146,146,146,146,146,180,181
     ,182,183,146,146,2548
F1   3380 DATA147,146,146,147,182
     ,183,146,180,181,146,146,146
     ,146,180,181,146,2549
98   3390 DATA151,152,153,147,146
     ,147,147,146,148,149,155,156
     ,157,147,147,146,2394
EB   3400 DATA147,146,147,148,147
     ,147,146,146,147,147,146,147
     ,146,147,146,147,2347
5D   3410 DATA147,147,146,146,147
     ,147,148,149,147,146,146,147
     ,146,147,147,146,2349
58   3420 DATA147,147,146,147,146
     ,147,147,147,147,180,181,147
     ,181,146,147,180,2483
6B   3430 DATA181,146,147,182,183
     ,147,180,181,147,182,183,180
     ,181,147,180,181,2728
A6   3440 DATA151,152,153,154,155
     ,157,158,147,147,146,155,156
     ,157,158,147,146,2439
96   3450 DATA146,148,149,150,146
     ,146,147,146,147,146,146,147
     ,146,146,146,147,2349
17   3460 DATA146,147,147,147,146
     ,147,146,146,146,147,146,146
     ,147,146,146,147,2343
84   3470 DATA146,146,146,146,148
     ,149,150,151,152,153,154,147
     ,152,153,154,146,2393
DB   3480 DATA146,155,156,157,158
     ,146,156,157,158,148,152,153
     ,146,147,146,146,2427
91   3490 DATA156,157,158,147,146
     ,146,146,148,149,150,147,146
     ,147,146,146,146,2381
6F   3500 DATA147,147,146,147,147
     ,146,147,146,147,147,146,147
     ,146,147,147,146,2346
DF   3510 DATA146,146,147,147,146
     ,147,147,146,147,147,146,151
     ,152,153,154,146,2368
65   3520 DATA147,147,146,147,147
     ,155,156,157,158,147,180,181
     ,148,149,150,147,2462
C6   3530 DATA147,148,149,150,182
     ,183,147,146,151,152,153,146
     ,147,146,147,147,2441
18   3540 DATA146,183,181,181,147
     ,147,146,146,182,183,181,146
     ,182,183,146,180,2660
9A   3550 DATA181,147,149,150,147
     ,146,146,147,147,182,183,146
     ,146,146,147,147,2457
E3   3560 DATA147,146,146,146,146
     ,147,147,146,146,146,146,147
     ,147,147,147,146,2343
92   3570 DATA147,146,146,147,147
     ,147,146,146,146,146,146,146
     ,180,181,146,146,2409
6C   3580 DATA146,147,147,147,151
     ,152,182,183,148,147,147,146
     ,146,150,155,156,2450
45   3590 DATA180,181,146,146,146
     ,147,147,148,149,150,182,183
     ,147,147,147,146,2492
1B   3600 DATA147,147,147,148,146
     ,147,147,146,146,147,147,147
     ,146,147,148,149,2352
25   3610 DATA150,146,147,146,146
     ,146,147,147,147,146,180,181
     ,147,147,147,147,2417
49   3620 DATA146,147,146,147,182
```

```
    ,183,146,146,146,147,147,148
    ,147,180,181,146,2485
E7  3630 DATA147,147,146,146,151
    ,152,147,182,183,146,146,146
    ,146,147,155,156,2443
07  3640 DATA146,148,149,150,146
    ,146,147,147,147,146,149,150
    ,147,147,147,147,2359
76  3650 DATA146,146,148,149,146
    ,147,146,146,146,146,146,147
    ,147,146,146,146,2344
04  3660 DATA146,147,147,147,147
    ,146,147,146,146,147,146,146
    ,146,146,146,146,2342
57  3670 DATA146,146,146,146,147
    ,147,146,146,147,146,147,147
    ,152,153,146,146,2354
DE  3680 DATA146,146,146,146,146
    ,148,156,157,158,146,146,147
    ,147,148,149,150,2382
AE  3690 DATA193,193,193,193,193
    ,193,193,193,193,193,193,193
    ,193,193,193,193,3088
FB  3700 DATA193,193,193,193,193
    ,193,193,193,193,193,193,193
    ,193,193,196,197,3095
3E  3710 DATA197,196,197,196,196
    ,197,196,197,146,147,147,146
    ,146,147,146,147,2744
7A  3720 DATA146,147,147,146,147
    ,147,146,147,146,147,146,147
    ,146,147,146,147,2345
73  3730 DATA147,146,147,146,147
    ,146,149,150,148,150,148,149
    ,150,146,180,181,2430
C4  3740 DATA193,198,199,184,185
    ,186,193,198,199,193,193,200
    ,201,187,188,189,3086
25  3750 DATA193,200,201,193,193
    ,193,193,190,191,192,193,193
    ,193,193,196,197,3104
96  3760 DATA196,196,197,196,196
    ,197,196,196,146,147,146,146
    ,147,146,147,147,2742
16  3770 DATA146,147,146,147,146
    ,146,147,146,147,147,146,148
    ,146,147,146,146,2344
51  3780 DATA147,147,146,151,152
    ,153,147,148,149,150,147,150
    ,147,155,156,157,2402
1F  3790 DATA176,177,178,137,136
    ,136,137,204,205,136,136,136
    ,136,136,137,137,2440
34  3800 DATA137,136,136,136,136
    ,136,137,136,136,136,137,137
    ,136,136,137,136,2181
5A  3810 DATA137,137,136,136,136
    ,136,136,136,137,136,136,136
    ,137,136,137,136,2181
46  3820 DATA137,136,203,136,164
    ,167,167,167,168,164,136,202
    ,159,161,164,162,2593
16  3830 DATA162,162,163,164,159
    ,160,160,159,164,162,162,162
    ,163,164,161,160,2587
2A  3840 DATA204,205,137,137,137
    ,136,136,176,177,178,137,137
    ,137,137,137,137,2445
D7  3850 DATA137,137,137,204,137
    ,136,136,137,137,136,137,137
    ,137,137,137,137,2256
EC  3860 DATA137,136,137,137,137
    ,137,173,179,137,137,137,136
    ,137,136,136,137,2266
3E  3870 DATA176,177,202,203,203
    ,137,202,203,137,137,137,137
    ,159,161,160,161,2692
28  3880 DATA159,159,161,160,159
    ,160,161,159,160,159,160,161
    ,160,159,160,161,2558
49  3890 DATA207,206,209,209,210
    ,206,136,209,210,206,207,136
    ,137,136,137,136,2897
D0  3900 DATA136,137,136,136,136
    ,136,137,137,137,137,137,136
    ,137,136,202,136,2249
B2  3910 DATA136,136,136,137,136
    ,136,136,136,203,202,136,136
    ,136,136,137,136,2311
BE  3920 DATA137,136,202,203,202
    ,203,136,136,136,137,137,136
    ,160,159,161,160,2541
8C  3930 DATA161,159,160,159,160
    ,161,161,159,160,159,160,161
    ,159,161,160,159,2559
F7  3940 DATA204,205,206,136,136
    ,136,136,210,207,206,137,137
    ,136,137,136,137,2602
7B  3950 DATA137,136,137,207,137
    ,136,137,136,137,136,136,137
    ,137,137,137,137,2257
CF  3960 DATA136,137,137,136,137
    ,136,136,137,137,137,136,137
    ,136,137,137,137,2186
6C  3970 DATA137,137,137,202,203
    ,202,203,137,137,137,136,137
    ,159,161,160,160,2545
6E  3980 DATA159,161,159,160,160
    ,161,160,161,159,161,160,159
    ,160,161,159,160,2560
B6  3990 DATA159,160,161,161,160
    ,159,159,160,161,159,159,161
    ,160,159,160,161,2559
B6  4000 DATA160,159,160,161,202
    ,203,202,137,137,202,203,137
    ,203,137,202,136,2741
A1  4010 DATA136,137,137,137,136
    ,137,136,137,203,136,136,136
    ,137,136,137,136,2250
DF  4020 DATA136,137,136,137,137
    ,137,136,137,137,136,136,137
    ,203,137,137,136,2252
FB  4030 DATA136,136,136,137,136
    ,137,204,205,136,137,137,137
    ,136,173,179,175,2437
BD  4040 DATA159,160,161,161,159
    ,160,159,160,161,159,161,159
    ,160,159,161,159,2558
FD  4050 DATA160,161,159,160,137
    ,202,203,137,137,136,137,202
    ,203,202,137,136,2609
93  4060 DATA136,136,137,136,137
    ,137,136,136,137,136,137,137
    ,136,137,136,136,2183
D9  4070 DATA137,137,137,136,137
    ,137,136,137,137,136,137,136
    ,137,137,136,136,2186
97  4080 DATA136,137,136,137,173
    ,179,128,129,130,137,136,137
    ,136,137,176,177,2321
60  4090 DATA159,161,164,162,162
    ,162,163,164,159,161,161,159
    ,164,162,162,162,2587
D0  4100 DATA163,164,160,159,136
    ,136,166,162,162,162,163,166
    ,136,136,136,136,2443
DD  4110 DATA136,136,136,136,136
    ,136,136,136,136,136,136,136
    ,137,136,136,137,2178
6A  4120 DATA137,137,136,136,136
    ,137,137,137,137,136,137,136
    ,207,137,136,136,2255
DD  4130 DATA136,136,136,136,173
    ,179,207,207,136,136,137,137
    ,137,207,176,177,2553
47  4140 DATA160,159,159,161,160
    ,161,159,161,159,160,161,159
    ,160,160,159,160,2558
96  4150 DATA161,159,161,159,137
    ,202,203,136,203,137,137,203
    ,203,137,137,136,2611
70  4160 DATA136,136,137,137,136
    ,136,207,207,136,137,136,137
    ,136,137,137,136,2324
5A  4170 DATA137,206,136,136,136
    ,137,136,137,137,136,137,137
    ,204,205,136,136,2389
E0  4180 DATA136,136,137,137,136
    ,137,137,204,205,137,136,136
    ,136,128,129,130,2297
63  4190 DATA207,206,136,136,137
    ,136,136,137,137,137,207,137
    ,136,137,136,136,2394
19  4200 DATA136,202,203,202,137
    ,137,137,137,137,136,202,136
    ,160,159,137,136,2494
D1  4210 DATA136,136,136,203,137
    ,169,161,159,137,137,137,137
    ,137,202,170,161,2455
3C  4220 DATA161,160,137,136,136
    ,136,136,202,159,160,159,161
    ,205,137,137,137,2459
5D  4230 DATA136,203,160,159,161
    ,160,137,204,205,136,202,202
    ,202,203,170,161,2801
8B  4240 DATA203,202,136,136,136
    ,137,137,207,209,210,160,202
    ,137,137,137,137,2623
4C  4250 DATA136,136,136,206,170
    ,169,202,136,136,136,136,137
    ,207,209,161,161,2574
E2  4260 DATA203,137,137,136,136
    ,210,207,209,160,159,203,136
    ,137,137,137,137,2581
39  4270 DATA207,206,170,202,137
    ,137,137,136,136,137,137,206
    ,202,136,136,136,2558
C4  4280 DATA137,137,137,137,137
    ,206,136,136,136,136,136,136
    ,136,207,209,210,2469
C1  4290 DATA180,181,148,146,147
    ,146,146,147,180,181,182,183
    ,146,147,147,147,2554
90  4300 DATA147,147,182,183,146
    ,146,146,146,146,146,147,147
    ,148,149,146,146,2418
A2  4310 DATA146,146,146,146,146
    ,146,146,148,146,146,147,146
    ,147,146,147,146,2341
FF  4320 DATA147,146,146,146,147
    ,147,147,146,146,146,146,146
    ,150,146,146,148,2346
8A  4330 DATA149,150,147,147,147
    ,146,148,149,150,147,146,148
    ,150,151,152,146,2373
40  4340 DATA0,104,0,104,16,104,
    0,104,0,104,0,104,0,104,0,10
    4,848
```

PROGRAM: CODE SAVER

```
AF  10 REM***************
B7  20 REM*  CODE SAVER *
BB  30 REM***************
8F  40 INPUT"[CLR]START ADDRESS"
    ;SA
92  50 INPUT "END ADDRESS";FA
36  60 INPUT "DEVICE NUMBER";DE
54  70 INPUT "FILE NAME";FI$
8E  80 POKE 194,SA/256:POKE193,S
    A-PEEK(194)*256
5B  90 POKE 175,FA/256:POKE174,F
    A-PEEK(175)*256
9D  100 L=LEN(FI$)
D6  110 FORI=1TOL:POKE1023+I,ASC
    (MID$(FI$,I,1)):NEXT
03  120 POKE187,0:POKE188,4:POKE
    183,L:POKE186,DE:SYS62954
```

PROGRAM: ACKROYDS SAGA

```
FD   10 A=A+1:PRINT"FILE"A:IFA=1T
     HENLOAD"CHARSET",8,1
07   20 IFA=2THENLOAD"SPRITES",8,
     1
62   30 IFA=3THENLOAD"OBJECT.1",8
     ,1
FC   40 IFA=4THENLOAD"HOUR-GLASS"
     ,8,1
1E   50 IFA=5THENLOAD"MAP",8,1
70   60 IFA=6THENLOAD"OBJECT.2",8
     ,1
34   70 POKE56,24:CLR
68   80 PRINT"{CLR,DOWN6}"TAB(10)
     "1...PLAY GAME"
90   90 PRINTTAB(10)"2...EDIT GAM
     E"
1A   100 GETI$:IFI$=""THEN100
D7   110 IF I$="2"THEN530
A7   120 IF I$<>"1"THEN100
BA   130 SYS32768
E2   140 PRINT"{HOME,WHITE,DOWN21
     ,RIGHT14}PRESS ANY KEY"
6D   150 GETI$:IFI$=""THEN150
5B   160 POKE 53272,21:PRINT"{CLR
     ,WHITE}":POKE53280,0:POKE532
     81,0:POKE53276,0:POKE53269,0
FD   170 FORI=53248TO53263:POKEI,
     0:NEXT
08   180 PC=PEEK(717)/PEEK(718)*1
     00
9E   190 LE=INT(PC/20)+1
8C   200 V=0:FORI=0TOLE:V=V+2↑I:N
     EXT
63   210 FORI=2040TO2047:POKEI,19
     4:NEXT
B1   220 RESTORE:FORI=1TOLE:READC
     O:NEXT
D0   230 Y=49:X=30:FOR J=1TOLE
1C   240 POKE 53287+J-1,CO
8C   250 POKE 53248+2*(J-1),X
9D   260 POKE 53249+2*(J-1),Y
AB   270 Y=Y+25:X=X+30:NEXT
F3   280 POKE 53277,V:POKE 53271,
     V:POKE 53269,V
17   290 DATA 9,12,6,3,7,1
8B   300 DATA PHOENIX,BLOB,FIRE,S
     NAKE,CLOUD,WHIRLWIND
CB   310 DATA SOLDIER,EAGLE,WIZAR
     D,GNOME,ZOMBIE
04   320 PRINT"{HOME,DOWN3}"TAB(1
     0);
74   330 ONLE GOTO 340,370,390,41
     0,430,450,63999
E6   340 PRINT"YOU'VE DIDN'T DO V
     ERY WELL"
B5   350 PRINTTAB(10)"IT'S BACK T
     O KNIGHT SCHOOL"
B9   360 PRINTTAB(10)"FOR YOU":GO
     TO470
A8   370 PRINT"NOT SO GOOD. YOU W
     ON'T KILL"
50   380 PRINTTTAB(10)"MANY DRAGO
     NS THAT WAY!!":GOTO470
98   390 PRINT"HMMMM A LITTLE PRA
     CTICE"
94   400 PRINTTTAB(10)"WON'T DO Y
     OU ANY HARM":GOTO470
85   410 PRINT"KEEP AT IT - YOU'L
     L SOON"
8A   420 PRINTTTAB(10)"BECOME A K
     NIGHT"       :GOTO470
2E   430 PRINT"VERY GOOD - THE KI
     NG GIVES"
6C   440 PRINTTTAB(10)"YOU A HERO
      MEDAL"      :GOTO470
C8   450 PRINT"WOW - YOU ARE PROM
     OTED TO"
C7   460 PRINTTTAB(10)"KNIGHT THI
     RD CLASS"    :GOTO470
4F   470 PRINT"{HOME,DOWN23,SPC7}
     PRESS ANY KEY TO PLAY AGAIN"
90   480 GETI$:IFI$=""THEN480
17   490 POKE 53269,0:POKE53277,0
     :POKE53271,0
D0   500 FORI=53248TO53263:POKEI,
     0:NEXT
C7   510 POKE 53270,200
8B   520 GOTO80
7B   530 PRINT"{CLR,DOWN6}"TAB(10
     )"1...CHANGE TIMINGS"
A9   540 PRINTTAB(10)"2...CHANGE
     # SUMS"
0F   550 GETI$:IFI$=""THEN550
88   560 IFI$="1"THEN710
B5   570 IFI$<>"2"THEN550
92   580 RESTORE:FORI=1TO6:READZ:
     NEXT
15   590 PRINT"{CLR,SPC5}CURRENT
     VALUES ARE:"
07   600 PRINT"{DOWN4}"
72   610 FOR N=1TO11
C4   620 T=PEEK(34610+N):READN$
05   630 PRINT"NASTY"N"("N$"):"T"
      SUMS"
00   640 NEXT
85   650 INPUT"{DOWN3}NASTY TO BE
      ALTERED (0 TO EXIT)";N
DB   660 IFN<0ORN>11THEN650
A4   670 IFN=0THEN80
CF   680 INPUT "# OF SUMS (1 TO 5
     )";S
A7   690 IFS<0ORS>9THEN680
AA   700 POKE 34610+N,S:GOTO580
7D   710 PRINT"{CLR,SPC5}CURRENT
     VALUES ARE:"
8F   720 PRINT"{DOWN4}"
43   730 FOR L=1TO5
C0   740 T=PEEK(34621+L)/6
A1   750 PRINT"LEVEL"L":"T" SECS"
78   760 NEXT
B0   770 INPUT"{DOWN3}LEVEL TO BE
      CHANGED (0 TO EXIT)";L
0C   780 IFL<0ORL>5THEN770
43   790 IFL=0THEN80
F7   800 INPUT "NEW VALUE >0 AND
     <42 SECONDS";S
80   810 IF S<1 OR S>42 THEN800
ED   820 POKE 34621+L,S*6
FE   830 GOTO710
```

PROGRAM: PROGRAM 1

```
CF   0 REM ENLARGE (PROGRAM 1)
5A   2 I=49152
B8   3 CK=0:IF PEEK(49153)=8 AND
     PEEK(49154)=162 THEN GOTO 11
     5
81   4 PRINT"{CLR,RVSON}PLEASE WA
     IT !!"
AA   5 READ A:IF A=256 THEN PRINT
     "{RVSON}OK !!":GOTO 115
E1   6 POKE I,A:I=I+1:CK=CK+A:GOT
     O 5
32   7 IF CK<>103578 THEN PRINT"{
     RVSON}ERROR !!":END
49   8 DATA 0,8,162,0,142,0,192,1
     69
2F   9 DATA 8,141,1,192,162,1,134
     ,251
ED   10 DATA 169,1,133,250,10,10,
     10,141
75   11 DATA 64,192,174,0,192,189
     ,0,56
99   12 DATA 141,160,192,78,160,1
     92,8,104
12   13 DATA 170,138,72,160,0,132
     ,254,140
8A   14 DATA 51,192,160,0,185,0,4
     8,40
04   15 DATA 106,8,153,0,48,152,2
     4,105
04   16 DATA 1,141,51,192,230,254
     ,164,254
AE   17 DATA 204,13,192,208,229,1
     04,198,251
63   18 DATA 208,215,173,13,192,1
     33,251,206
1F   19 DATA 1,192,208,199,169,8,
     141,1
24   20 DATA 192,198,250,208,36,1
     73,17,192
2E   21 DATA 133,250,238,0,192,17
     3,0,192
F6   22 DATA 201,8,208,21,173,53,
     192,24
FD   23 DATA 105,1,141,53,192,141
     ,59,192
13   24 DATA 144,6,238,54,192,238
     ,60,192
25   25 DATA 96,173,53,192,24,105
     ,1,141
62   26 DATA 53,192,141,59,192,14
     4,131,238
18   27 DATA 54,192,238,60,192,24
     ,144,245
1A   28 DATA 0,162,0,142,0,4,24,1
     73
D2   29 DATA 164,192,105,1,141,16
     4,192,144
71   30 DATA 3,238,165,192,56,165
     ,250,233
63   31 DATA 1,133,250,176,2,198,
     251,165
A7   32 DATA 251,208,224,165,250,
     208,220,96
C9   33 DATA 173,14,220,41,254,14
     1,14,220
D4   34 DATA 165,1,41,251,133,1,1
     73,0
04   35 DATA 208,141,0,56,24,173,
     215,192
BE   36 DATA 105,1,141,215,192,14
     4,4,238
1C   37 DATA 216,192,24,173,218,1
     92,105,1
19   38 DATA 141,218,192,144,3,23
     8,219,192
89   39 DATA 56,165,250,233,1,133
     ,250,176
6E   40 DATA 2,198,251,165,251,20
     8,207,165
07   41 DATA 250,208,203,165,1,9,
     4,133
A3   42 DATA 1,173,14,220,9,1,141
     ,14
93   43 DATA 220,96,169,0,160,0,3
     2,145
A4   44 DATA 179,32,12,188,169,0,
     160,40
95   45 DATA 32,145,179,32,43,186
     ,32,12
BD   46 DATA 188,169,0,160,0,32,1
     45,179
03   47 DATA 32,106,184,32,247,18
     3,169,0
7A   48 DATA 24,101,20,141,95,193
```

```
    ,169,4
93  49 DATA 101,21,141,96,193,16
    9,0,24
35  50 DATA 101,20,141,97,193,16
    9,216,101
E2  51 DATA 21,141,98,193,96,1,1
    ,0
FE  52 DATA 0,0,0,0,169,1,141,99

BD  53 DATA 193,173,95,193,133,2
    52,173,96
47  54 DATA 193,133,253,173,97,1
    93,133,254
49  55 DATA 173,98,193,133,255,1
    62,1,160
3B  56 DATA 0,173,93,193,238,93,
    193,145
D0  57 DATA 252,173,94,193,145,2
    54,165,252
3B  58 DATA 24,105,40,133,252,14
    4,2,230
63  59 DATA 253,165,254,24,105,4
    0,133,254
1F  60 DATA 144,2,230,255,202,20
    8,216,173
B9  61 DATA 95,193,24,105,1,141,
    95,193
2E  62 DATA 144,3,238,96,193,173
    ,97,193
62  63 DATA 24,105,1,141,97,193,
    144,3
57  64 DATA 238,98,193,206,99,19
    3,208,161
7C  65 DATA 96,32,43,195,141,53,
    192,141
4C  66 DATA 59,192,140,54,192,14
    0,60,192
1C  67 DATA 96,32,43,195,141,30,
    192,140
48  68 DATA 31,192,96,32,43,195,
    141,94
98  69 DATA 193,96,32,43,195,141
    ,93,193
A4  70 DATA 96,32,43,195,201,40,
    144,3
92  71 DATA 76,72,178,141,52,193
    ,32,43
AA  72 DATA 195,201,25,144,3,76,
    72,178
22  73 DATA 141,29,193,32,26,193
    ,96,32
9B  74 DATA 43,195,201,0,208,3,7
    6,72
5E  75 DATA 178,141,13,192,141,1
    01,193,32
41  76 DATA 43,195,201,0,208,3,7
    6,72
D8  77 DATA 178,141,17,192,141,1
    26,193,172
13  78 DATA 13,192,136,169,0,32,
    145,179
E5  79 DATA 32,12,188,169,0,160,
    8,32
2E  80 DATA 145,179,32,43,186,32
    ,12,188
E4  81 DATA 172,17,192,169,0,32,
    145,179
BB  82 DATA 32,43,186,32,12,188,
    169,0
45  83 DATA 160,1,32,145,179,32,
    106,184
CD  84 DATA 32,247,183,165,20,14
    1,121,192
81  85 DATA 96,32,43,195,141,215
    ,192,140
8E  86 DATA 216,192,32,43,195,14
    1,218,192
E2  87 DATA 140,219,192,32,43,19
    5,133,250
67  88 DATA 132,251,32,200,192,9
    6,32,43
56  89 DATA 195,141,164,192,140,
    165,192,32
77  90 DATA 43,195,133,250,132,2
    51,32,43
C6  91 DATA 195,141,162,192,32,1
    61,192,96
84  92 DATA 32,43,195,201,40,144
    ,3,76
F9  93 DATA 72,178,72,32,43,195,
    201,25
8C  94 DATA 144,3,76,72,178,24,1
    70,104
3D  95 DATA 168,32,240,255,96,32
    ,225,194
84  96 DATA 32,253,174,32,214,19
    4,134,253
DC  97 DATA 132,254,32,230,225,1
    66,253,164
73  98 DATA 254,169,251,76,95,22
    5,32,138
8C  99 DATA 173,32,247,183,166,2
    0,164,21
6E 100 DATA 96,162,1,160,0,169,
    0,32
E2 101 DATA 186,255,32,121,0,24
    0,14,32
13 102 DATA 87,226,32,253,174,3
    2,214,194
0C 103 DATA 134,251,132,252,96,
    162,11,76
4A 104 DATA 55,164,169,0,133,10
    ,32,225
C7 105 DATA 194,32,230,225,165,
    10,166,251
A9 106 DATA 164,252,32,213,255,
    144,3,76
A7 107 DATA 249,224,165,10,240,
    3,76,126
4A 108 DATA 225,32,183,255,41,1
    91,240,212
12 109 DATA 76,156,225,32,253,1
    74,32,138
66 110 DATA 173,32,247,183,165,
    20,164,21
82 111 DATA 96,256
49 115 :
```

PROGRAM: PROGRAM 2

```
READY.

25  119 REM ENLARGE (PROGRAM 2)
16  120 PC=49508:DS=49609:CD=496
    25:CC=49635:BC=49642
F6  130 XY=49649:WH=49679:EC=491
    54:MC=49769:MF=49798:CM=4982
    4
E0  135 MS=49853:ML=49922:REM MS
    AVE/MLOAD
B6  140 :
E6  150 SYS MC,53248,14336,2048:
    SYS MC,53248,15872,512:SYS M
    C,55296,14848,512
72  160 SYS MF,12288,8,0:REM "@"
     NOW - " "
AF  170 SYS DS,12296:REM DATA ST
    ORE
A1  180 SYS CD,14336:REM CHAR DA
    TA
E1  190 SYS MF,1024,1000,0:REM C
    LEAR USING @
01  200 POKE 53272,(PEEK(53272)A
    ND240)+12
E1  210 SYS BC,1:REM SET BASE CH
    ARACTER
5F  220 GOTO 1000:REM START PROG
DC  230 :
9D  240 REM ROUTINE TO PRINT CHA
    RACTERS
EA  250 SYS XY,X,Y:SYS WH,WIDTH,
    HEIGHT:SYS CC,COL
33  260 FOR A=1 TO LEN(TEXT$)
5F  270 C$=MID$(TEXT$,A,1):V%=AS
    C(C$)
A9  290 SYS CD,14336+(V%*8):SYS
    EC:SYS PC:NEXT A:RETURN
D0  999 :
81 1000 REM SHOW HOW TO USE
8C 1010 POKE53281,0:POKE53280,0
    :POKE646,1
73 1020 TEXT$="YOUR COMMODORE":
    X=6:Y=0:WIDTH=2:HEIGHT=2:COL
    =1:GOSUB250
F8 1030 TEXT$="PRESENTS":X=0:Y=
    4:WIDTH=5:HEIGHT=1:COL=3:GOS
    UB250
56 1040 X=6:Y=9:WIDTH=4:HEIGHT=
    3
82 1050 Z$="ENLARGE"
60 1060 FOR L1=1 TO LEN(Z$):TEX
    T$=MID$(Z$,L1,1):COL=(L1 AND
     7)+1:GOSUB250:X=X+4
CD 1070 NEXT L1
B8 1080 TEXT$="WRITTEN BY A.WRI
    GHT":X=1:Y=15:WIDTH=2:HEIGHT
    =1:COL=5:GOSUB250
A7 1090 GET K$:IF K$="" THEN 10
    90
```

PROGRAM: ARRAY LOADER

```
READY.

5A  10 A=49152
8D  20 FORI=0TO115
3C  25 C=0
65  30 FORJ=0TO6
00  50 READK
0B  60 POKEA,K
57  70 A=A+1:C=C+K:T=T+K
D2  80 NEXT
F5  90 READL:IFC<>LTHENPRINT"DAT
    A ERROR IN LINE"I+200:END
E6 100 NEXT
1C 110 IFT<>92881THENPRINT"ERRO
    R SOMEWHERE IN DATA!"
F8 120 END
C2 200 DATA76,9,192,76,135,193,
    76,757
2C 201 DATA0,195,32,120,192,169
    ,0,708
6E 202 DATA141,66,3,238,66,3,17
    3,690
8A 203 DATA66,3,32,218,192,160,
    0,671
10 204 DATA177,100,204,67,3,144
    ,2,697
73 205 DATA169,32,32,62,192,145
    ,251,883
24 206 DATA173,134,2,145,253,20
    0,204,1111
04 207 DATA65,3,208,231,173,66,
    3,749
4C 208 DATA205,64,3,208,212,96,
    72,860
9E 209 DATA41,15,141,77,3,104,4
    1,422
E7 210 DATA112,74,74,74,74,170,
    189,767
```

```
2D  211 DATA104,192,13,77,3,96,72,557
05  212 DATA41,15,141,77,3,104,41,422
DC  213 DATA112,74,74,74,74,170,189,767
DF  214 DATA112,192,13,77,3,96,0,493
FE  215 DATA16,32,48,0,16,64,80,256
66  216 DATA64,80,32,48,96,112,64,496
2C  217 DATA80,32,115,0,32,138,173,570
9E  218 DATA165,71,72,165,72,72,32,649
1E  219 DATA115,0,32,138,173,165,71,694
B7  220 DATA72,165,72,72,32,115,0,528
97  221 DATA32,158,173,32,143,173,165,876
1F  222 DATA71,133,109,165,72,133,110,793
BD  223 DATA104,133,108,104,133,107,104,793
0A  224 DATA133,106,104,133,105,160,1,742
22  225 DATA177,107,141,64,3,160,1,653
CC  226 DATA177,105,141,78,3,165,105,774
D9  227 DATA141,68,3,165,106,141,69,693
FD  228 DATA3,165,107,141,70,3,165,654
42  229 DATA108,141,71,3,165,109,141,738
9C  230 DATA72,3,165,110,141,73,3,567
8B  231 DATA96,170,10,24,109,68,3,480
23  232 DATA133,105,169,0,109,69,3,588
72  233 DATA133,106,138,10,24,109,70,590
55  234 DATA3,133,107,169,0,109,71,592
59  235 DATA3,133,108,138,141,74,3,600
6D  236 DATA10,24,109,74,3,24,109,353
34  237 DATA72,3,133,109,169,0,109,595
E0  238 DATA73,3,133,110,160,1,177,657
65  239 DATA105,133,251,133,253,24,136,1035
EC  240 DATA177,105,105,4,133,252,24,800
64  241 DATA105,212,133,254,200,177,107,1188
8F  242 DATA141,65,3,160,0,177,109,655
DB  243 DATA141,67,3,200,177,109,133,830
6F  244 DATA100,200,177,109,133,101,96,916
36  245 DATA172,65,3,136,192,255,240,1063
A2  246 DATA47,177,251,201,32,240,245,1193
D1  247 DATA200,140,67,3,152,32,125,719
F9  248 DATA180,160,0,177,251,32,83,883
B5  249 DATA192,145,98,200,204,67,3,909
8D  250 DATA208,243,160,0,173,67,3,854
38  251 DATA145,109,200,165,98,145,109,971
EF  252 DATA200,165,99,145,109,96,160,974
FE  253 DATA0,152,145,109,96,160,0,662
A8  254 DATA177,251,41,127,145,251,200,1192
F9  255 DATA204,65,3,208,244,96,32,852
B0  256 DATA120,192,169,1,141,66,3,692
50  257 DATA173,78,3,240,3,141,66,704
3C  258 DATA3,173,66,3,32,218,192,687
4C  259 DATA160,0,177,251,9,128,145,870
FC  260 DATA251,173,134,2,145,253,200,1158
0D  261 DATA204,65,3,208,239,169,0,888
31  262 DATA141,75,3,172,75,3,177,646
A4  263 DATA251,141,76,3,169,228,145,1013
39  264 DATA251,169,255,141,74,3,206,1099
C5  265 DATA74,3,240,10,32,195,194,748
88  266 DATA32,228,255,240,243,208,26,1232
50  267 DATA173,76,3,172,75,3,145,647
0D  268 DATA251,169,255,141,74,3,206,1099
06  269 DATA74,3,240,214,32,195,194,952
0E  270 DATA32,228,255,240,243,72,172,1242
BC  271 DATA75,3,173,76,3,145,251,726
2C  272 DATA104,201,32,144,28,201,96,806
89  273 DATA176,24,32,62,192,9,128,623
41  274 DATA145,251,200,238,75,3,204,1116
A1  275 DATA65,3,208,5,169,0,141,591
9B  276 DATA75,3,76,181,193,201,29,758
96  277 DATA240,235,201,157,208,18,206,1265
13  278 DATA75,3,136,192,255,208,237,1106
59  279 DATA172,65,3,136,140,75,3,594
20  280 DATA76,181,193,201,17,208,24,900
EA  281 DATA32,120,193,238,66,3,173,825
4A  282 DATA66,3,205,64,3,144,7,492
23  283 DATA240,5,169,1,141,66,3,625
27  284 DATA76,143,193,201,145,208,25,991
62  285 DATA32,120,193,173,66,3,201,788
3D  286 DATA1,240,6,206,66,3,76,598
66  287 DATA143,193,173,64,3,141,66,783
C3  288 DATA3,76,143,193,201,13,240,869
89  289 DATA54,201,19,208,8,169,0,659
89  290 DATA141,75,3,76,181,193,201,870
8F  291 DATA147,208,15,160,0,169,160,859
5E  292 DATA145,251,200,204,65,3,208,1076
27  293 DATA248,76,116,194,201,20,208,1063
BB  294 DATA6,32,201,194,76,33,194,736
65  295 DATA201,148,208,6,32,223,194,1012
B5  296 DATA76,181,193,76,181,193,32,932
5B  297 DATA120,193,169,0,141,66,3,692
59  298 DATA238,66,3,173,66,3,32,581
44  299 DATA218,192,32,59,193,173,66,933
91  300 DATA3,205,64,3,208,236,96,815
BE  301 DATA162,128,202,208,253,96,192,1241
E6  302 DATA0,240,17,177,251,136,145,966
74  303 DATA251,200,200,204,65,3,144,1067
4A  304 DATA244,136,169,160,145,251,96,1201
D3  305 DATA140,74,3,200,204,65,3,689
D8  306 DATA240,16,172,65,3,136,136,768
BC  307 DATA177,251,200,145,251,136,204,1364
9E  308 DATA74,3,208,244,172,74,3,778
1E  309 DATA169,160,145,251,96,32,120,973
61  310 DATA192,169,0,141,66,3,238,809
34  311 DATA66,3,173,66,3,32,218,561
12  312 DATA192,160,0,169,32,145,251,949
57  313 DATA200,204,65,3,208,248,173,1101
D4  314 DATA66,3,205,64,3,208,227,776
F1  315 DATA96,0,0,0,0,0,0,96
```

```
E1  100 REM ************************
    ***
47  110 REM ** SET UP ARRAY DEFS **
2D  120 REM ************************
    ***
C5  130 DIMP%(30),L%(30),S$(30)
57  140 READL
AC  150 L%(0)=L
52  160 FORI=1TOL:READP%(I),L%(I):NEXT
62  170 DATA29
81  180 DATA132,9,152,7,213,26,299,3,316,3
4F  190 DATA401,19,441,19,481,19,521,19,561,19,605,15
94  200 DATA421,18,461,18,501,18,541,18,581,18,625,14
00  210 DATA721,19,761,19,801,19,841,19,881,19,925,15
CD  220 DATA741,18,781,18,821,18,861,18,901,18,945,14
B3  230 REM ************************
    ******
66  240 REM ** SET UP EXAMPLE DATA **
CF  250 REM ************************
    ******
2A  260 FORI=1TOL:READS$(I):NEXT
```

```
D6  270 DATAZXY-335,WDG447
6E  280 DATACOMPRESSION WIDGET
73  290 DATA200,500
FF  300 DATAFLAKEY & CO,SECTION
    C,INDUSTRIAL ESTATE,BIGTOWN,
    SUSSEX,(0228) 542234
FF  310 DATAWORMEX LTD,TRADE SAL
    ES,7 MANOR ROAD,FROODELCHEST
    ER,FC23 5QQ,(0344) 60393
84  320 DATAHONEST JIM'S,THE YAR
    D,NR RAILWAY STATION,SPLOTBU
    RY,SP4 6JC,(0932) 54223
54  330 DATA,,,,,
FA  340 REM ********************
    ****
A8  350 REM ** DRAW SCREEN LAYOU
    T **
46  360 REM ********************
    ****
C0  370 POKE53280,0:POKE53281,0
4C  380 PRINT"{CLR,YELLOW}";
17  390 PRINT" THIS IS AN EXAMPL
    E SCREEN TO SHOW HOW"
02  400 PRINT"{SPC5}THE ARRAY SU
    BROUTINES ARE USED{GREEN}
51  410 PRINT"{CA,S*20,CR,S*17,C
    S}";
46  420 PRINT"{S-}STOCK CODE:{SP
    C9,S-}REFERENCE:{SPC7,S-}";
70  430 PRINT"{CQ,S*20,CE,S*17,C
    W}";
1F  440 PRINT"{S-}DESCRIPTION:{S
    PC26,S-}";
19  450 PRINT"{CQ,S*22,CR,S*15,C
    W}";
92  460 PRINT"{S-}QUANTITY IN ST
    OCK:{SPC4,S-}MAX ALLOWED:{SP
    C3,S-}";
AA  470 PRINT"{CQ,S*19,CR,S*2,CE
    ,S*15,CW}";
FF  480 PRINT"{S-}SUPPLIER #1:{S
    PC7,S-}SUPPLIER #2:{SPC6,S-}
    ";
2E  490 PRINT"{S-,SPC19,S-,SPC18
    ,S-}";
24  500 PRINT"{S-,SPC19,S-,SPC18
    ,S-}";
22  510 PRINT"{S-,SPC19,S-,SPC18
    ,S-}";
0B  520 PRINT"{S-,SPC19,S-,SPC18
    ,S-}";
09  530 PRINT"{S-,SPC19,S-,SPC18
    ,S-}";
AF  540 PRINT"{S-}TEL:{SPC15,S-}
    TEL:{SPC14,S-}";
D9  550 PRINT"{CQ,S*19,CE,S*18,C
    W}";
3E  560 PRINT"{S-}SUPPLIER #3:{S
    PC7,S-}SUPPLIER #4:{SPC6,S-}
    ";
61  570 PRINT"{S-,SPC19,S-,SPC18
    ,S-}";
57  580 PRINT"{S-,SPC19,S-,SPC18
    ,S-}";
45  590 PRINT"{S-,SPC19,S-,SPC18
    ,S-}";
3B  600 PRINT"{S-,SPC19,S-,SPC18
    ,S-}";
B9  610 PRINT"{S-,SPC19,S-,SPC18
    ,S-}";
DF  620 PRINT"{S-}TEL:{SPC15,S-}
    TEL:{SPC14,S-}";
71  630 PRINT"{CZ,S*19,CE,S*18,C
    X,HOME,WHITE}";
66  640 REM POKE ONTO LAST SCREE
    N CHR AS IT
BC  650 REM WOULD APPEAR IF PRIN
    TED
8D  660 POKE2023,125:POKE56295,5

4F  670 REM ********************
    ****
E2  680 REM ** DISPLAY ARRAY DAT
    A **
5B  690 REM ********************
    ****
95  700 SYS49152,P%(0),L%(0),S$(
    0)
3D  710 REM ********************
    ***********
30  720 REM ** ALLOW USER TO EDI
    T SCREEN **
49  730 REM ********************
    ***********
CC  740 SYS49155,P%(0),L%(0),S$(
    0)
75  750 REM ********************
    ***********
72  760 REM ** CLEAR SCREEN ARRA
    Y FIELDS **
80  770 REM ********************
    ***********
04  780 SYS49158,P%(0),L%(0),S$(
    0)
56  790 REM ********************
    ********
9E  800 REM ** EXIT FROM PROGRAM
     WITH **
EC  810 REM **  ARRAY S$  CONTAI
    NING  **
E9  820 REM **        EDITED DATA
        **
EE  830 REM ********************
    ********
```

PROGRAM: VEHICLES.DATA

```
AF  10 REM**********************
    *
2E  20 REM*   SPRITES LIRBARY
    *
30  30 REM*   ---------------
    *
C4  40 REM*  VEHICLES SPRITES
    *
CE  50 REM*  BASIC DATA LOADER
    *
99  60 REM* SPRITES DESIGNED BY
    *
74  70 REM*       MIKE BENN
    *
C5  80 REM**********************
    *
DD  90 BL=255  :LN=190  :SA=1024
    0
89  100 FOR L=0 TO BL:CX=0:FOR D
    =0 TO 15
4F  110 READ A:IF A>255THENPRINT
    "NUMBER TO LARGE";LN+(L*10):
    STOP
98  120 CX=CX+A:POKE SA+L*16+D,A
    :NEXT D
D9  130 READ A:IF A><CX THENPRIN
    T"ERROR IN LINE";LN+(L*10):S
    TOP
37  140 NEXTL:POKE43,0:POKE44,40
    :POKE45,0:POKE46,56
00  150 SAVE"VEHICLES",8,1:END
EF  160 REM**********************
    ***********
3B  170 REM TAPE USERS WILL NEED
     TO CHANGE          DEVICE N
    UMBER FROM 8 TO 1
FB  180 REM**********************
    ***********
2D  190 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,0
99  200 DATA 2,160,0,0,192,0,0,8
    5,0,5,64,0,26,64,0,160,758
01  210 DATA 80,0,129,132,0,129,
    36,2,4,33,2,4,33,2,1,85,672
DB  220 DATA 0,128,32,0,128,32,0
    ,128,128,0,32,128,0,10,0,95,
    841
11  230 DATA 0,0,0,0,0,0,0,0,0,2
    ,192,0,0,208,0,0,402
38  240 DATA 16,0,0,16,0,85,80,0
    ,0,85,0,1,26,64,1,18,392
9C  250 DATA 0,4,144,128,6,16,32
    ,18,16,32,18,4,32,194,0,32,6
    76
6F  260 DATA 194,0,32,2,0,32,0,1
    28,128,0,34,0,0,42,0,0,592
5C  270 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,0
B1  280 DATA 0,0,0,0,0,0,0,2,0,0,2
    ,128,2,86,165,0,2,387
3B  290 DATA 128,0,2,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,130
BE  300 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,0
1C  310 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,176,0,0,176
BF  320 DATA 48,0,0,48,0,0,48,0,
    0,48,0,85,117,160,0,48,602
51  330 DATA 0,0,48,0,0,48,0,0,4
    8,0,0,176,0,0,0,0,320
86  340 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,1,1
C0  350 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,44,0,0,12,0,56
5C  360 DATA 168,2,0,48,0,0,21,8
    5,1,80,0,6,144,0,24,20,599
C1  370 DATA 0,32,97,0,32,72,64,
    129,8,64,129,8,16,128,85,85,
    949
25  380 DATA 32,8,56,32,8,0,32,3
    2,0,8,32,0,2,128,0,26,396
D7  390 DATA 0,0,0,0,0,0,0,0,0,0
    ,44,0,0,13,0,160,217
30  400 DATA 1,0,192,1,0,85,85,0
    ,64,5,80,64,17,164,64,17,839

CB  410 DATA 32,64,73,8,64,97,2,
    65,33,2,65,32,66,84,32,2,721

32  420 DATA 56,32,2,0,32,2,0,8,
    8,0,2,32,0,2,160,255,591
3C  430 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,0
CB  440 DATA 0,44,0,0,12,0,0,12,
    0,128,14,0,160,14,149,169,70
    2
42  450 DATA 94,0,160,14,0,128,1
    4,0,0,12,0,0,44,0,0,0,466
7A  460 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,27,27
04  470 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,0
A3  480 DATA 11,0,0,3,0,0,3,0,0,
    3,0,128,3,0,165,87,403
B3  490 DATA 86,128,3,0,0,3,0,0,
    3,0,0,11,0,0,0,0,234
92  500 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,26,26
6C  510 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,0
A5  520 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,170,170
E3  530 DATA 160,0,170,160,1,85,
    64,1,85,64,1,85,64,1,105,64,
    1110
18  540 DATA 1,190,85,3,190,85,0
    ,190,0,0,190,0,0,40,0,16,990
```

```
03  550 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,176,176
72  560 DATA 0,0,48,0,0,4,0,0,4,
    0,0,5,0,0,9,0,70
64  570 DATA 0,9,0,0,9,0,0,9,84,
    0,9,64,0,9,40,0,233
83  580 DATA 85,190,0,85,190,0,0
    ,190,0,0,190,0,0,40,0,27,997

83  590 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
90  600 DATA 0,0,0,0,0,0,1,85,1,
    170,154,1,170,165,1,170,918
11  610 DATA 165,1,170,165,1,170
    ,154,0,1,85,0,0,0,0,0,0,912
1B  620 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,17,17
EB  630 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
5E  640 DATA 0,0,180,0,0,93,0,0,
    157,0,0,93,86,0,93,86,788
10  650 DATA 0,93,86,0,157,0,0,9
    3,0,0,180,0,0,0,0,0,609
35  660 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,208,208
33  670 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
43  680 DATA 0,0,0,0,0,0,0,42,170,
    0,106,149,0,101,85,0,41,694
C4  690 DATA 255,0,169,127,2,134
    ,159,2,4,191,2,4,159,2,5,85,
    1300
9A  700 DATA 2,63,249,2,128,176,
    0,130,128,0,170,0,0,42,0,74,
    1164
E4  710 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,11,192,0,0,203
54  720 DATA 80,0,21,80,0,85,64,
    0,85,85,0,85,106,64,205,106,
    1066
16  730 DATA 0,184,66,128,238,64
    ,128,178,16,160,50,4,32,130,
    0,32,1410
3C  740 DATA 226,0,32,2,128,160,
    0,162,128,0,42,0,0,8,0,0,888

63  750 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
6C  760 DATA 0,0,0,0,0,0,0,0,0,0,4
    2,169,2,106,170,2,106,597
E1  770 DATA 170,2,106,170,0,42,
    169,0,0,0,0,0,0,0,0,0,659
5C  780 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
07  790 DATA 0,0,0,0,0,0,0,0,0,8
    ,0,0,3,0,0,3,14
67  800 DATA 0,0,0,192,0,0,192,0
    ,85,208,0,85,213,96,85,213,1
    369
BC  810 DATA 96,85,213,96,85,208
    ,0,0,192,0,0,192,0,3,0,0,117
    0
8B  820 DATA 8,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,44,52
97  830 DATA 0,0,0,5,85,85,21,85
    ,85,21,85,85,21,85,85,21,769

8A  840 DATA 85,85,21,85,85,21,8
    5,85,21,85,85,0,0,0,21,85,84
    9
61  850 DATA 85,21,85,85,21,85,8
    5,21,85,85,21,165,85,22,169,
    85,1205
6B  860 DATA 22,169,85,150,249,8
    5,2,248,0,2,168,0,0,160,0,20
    0,1540
40  870 DATA 0,0,0,85,64,0,95,19
    2,0,95,192,0,95,192,0,95,110
    5
BC  880 DATA 240,0,95,240,0,95,2
    40,0,95,240,0,0,5,64,85,85,1
    484

DD  890 DATA 80,85,85,84,85,85,8
    4,85,85,84,85,86,148,85,90,1
    64,1500
F8  900 DATA 85,90,164,85,91,224
    ,0,11,224,0,10,160,0,2,128,9
    ,1283
33  910 DATA 0,0,0,0,0,0,21,85,8
    5,149,85,85,149,85,85,149,97
    8
E4  920 DATA 85,85,149,85,85,149
    ,85,85,149,85,85,149,85,85,1
    49,85,1680
6C  930 DATA 85,149,85,85,149,85
    ,85,149,85,85,149,85,85,149,
    85,85,1680
9F  940 DATA 149,85,85,21,85,85,
    0,0,0,0,0,0,0,0,0,211,721
24  950 DATA 0,0,0,0,0,0,85,85,64
    ,95,117,84,85,117,84,85,901

40  960 DATA 117,84,85,117,84,85
    ,117,84,85,117,84,85,117,84,
    85,117,1547
C5  970 DATA 84,85,117,84,85,117
    ,84,85,117,84,85,117,84,85,1
    17,84,1514
C1  980 DATA 95,117,84,85,85,64,
    0,0,0,0,0,0,0,0,0,1,531
71  990 DATA 0,0,0,21,85,84,21,8
    5,85,21,85,85,21,85,85,21,78
    4
AA  1000 DATA 85,85,21,85,85,21,
    85,85,21,85,85,0,0,0,21,85,8
    49
09  1010 DATA 85,21,85,85,21,85,
    85,21,85,85,21,165,85,22.168
    ,0,1119
7A  1020 DATA 38,169,85,2,249,85
    ,2,248,0,2,168,0,0,160,0,32,
    1240
CD  1030 DATA 0,0,0,0,0,0,0,0,0,
    84,0,0,252,0,0,255,591
7B  1040 DATA 0,0,255,0,0,255,19
    2,0,255,192,0,255,240,0,85,8
    5,1814
E8  1050 DATA 64,85,85,85,85,85,
    85,85,85,85,85,86,149,0,10,1
    65,1324
8C  1060 DATA 85,90,166,85,91,22
    4,0,11,224,0,10,160,0,2,128,
    123,1399
A7  1070 DATA 0,0,0,0,0,0,21,85,
    85,21,85,85,21,85,85,21,594
1C  1080 DATA 85,85,21,85,85,21,
    85,85,21,85,85,21,85,85,21,8
    5,1040
E2  1090 DATA 85,21,85,85,21,85,
    85,21,85,85,21,85,85,21,85,8
    5,1040
6A  1100 DATA 21,85,85,21,85,85,
    21,85,85,0,0,0,0,0,0,219,792

8D  1110 DATA 0,0,0,0,0,0,0,0,0,0,
    85,85,80,255,117,84,253,959
48  1120 DATA 245,84,87,245,84,8
    7,245,84,87,245,84,87,245,84
    ,87,245,2325
56  1130 DATA 84,87,245,84,87,24
    5,84,87,245,84,87,245,84,253
    ,245,84,2330
FE  1140 DATA 255,117,84,85,85,8
    0,0,0,0,0,0,0,0,0,0,255,961
13  1150 DATA 0,0,0,0,0,0,0,1,85,8
    5,1,85,85,1,85,85,1,514
32  1160 DATA 85,85,1,85,85,1,85
    ,85,1,85,85,0,0,0,1,85,769
CB  1170 DATA 85,1,85,85,1,85,85
    ,1,85,85,1,90,85,1,106,149,1
    030
35  1180 DATA 2,106,149,0,47,149
    ,0,47,128,0,42,128,0,10,0,22
    6,1034

1C  1190 DATA 0,0,0,0,0,0,84,0,0
    ,85,0,0,255,0,0,255,679
8B  1200 DATA 0,0,255,0,0,255,0,
    0,255,0,0,85,64,0,85,85,1084

D5  1210 DATA 64,85,85,80,85,85,
    80,85,85,80,85,90,80,85,106,
    144,1404
3D  1220 DATA 85,106,168,85,101,
    128,0,37,128,0,42,128,0,10,0
    ,97,1115
F6  1230 DATA 0,0,0,0,0,0,0,0,0,
    1,85,85,1,85,85,1,343
A6  1240 DATA 85,85,1,85,85,1,85
    ,85,1,85,85,1,85,85,1,85,940
B8  1250 DATA 85,1,85,85,1,85,85
    ,1,85,85,1,85,85,1,85,85,940

68  1260 DATA 1,85,85,1,85,85,0,
    0,0,0,0,0,0,0,0,1,343
1E  1270 DATA 0,0,0,0,0,0,0,0,0,
    85,85,88,247,85,88,87,765
E9  1280 DATA 85,88,87,85,88,87,
    85,104,87,85,104,87,85,104,8
    7,85,1433
3E  1290 DATA 104,87,85,104,87,8
    5,104,87,85,104,87,85,88,87,
    85,88,1452
AB  1300 DATA 247,85,88,85,85,88
    ,0,0,0,0,0,0,0,0,0,0,44,722
B2  1310 DATA 0,0,0,0,0,0,0,0,0,
    0,0,1,0,0,1,0,2
32  1320 DATA 0,1,0,0,1,0,0,1,0,
    0,1,0,0,1,85,85,175
B0  1330 DATA 85,85,85,85,85,85,
    85,85,85,85,86,149,85,90,165
    ,85,1510
48  1340 DATA 26,165,85,11,239,2
    55,11,224,0,10,160,0,2,128,0
    ,225,1541
06  1350 DATA 0,0,0,0,0,0,0,0,0,
    84,0,0,252,0,0,255,591
98  1360 DATA 0,0,255,0,0,255,19
    2,0,255,192,0,255,240,0,85,8
    5,1814
27  1370 DATA 80,85,85,85,85,85,
    85,85,85,85,85,86,149,85,90,
    165,1505
74  1380 DATA 85,90,166,255,249,
    96,0,9,96,0,10,160,0,2,128,1
    22,1468
67  1390 DATA 0,0,0,0,0,0,0,0,0,
    85,85,85,106,170,170,119,820

C9  1400 DATA 119,119,93,221,221
    ,119,119,119,93,221,221,119,
    119,119,93,221,2336
3B  1410 DATA 221,119,119,119,93
    ,221,221,119,119,119,93,221,
    221,119,119,119,2362
33  1420 DATA 93,221,221,85,85,8
    5,0,0,0,0,0,0,0,0,0,1,791
E9  1430 DATA 0,0,0,0,0,0,0,0,0,
    85,85,85,127,117,85,125,709
F8  1440 DATA 245,85,87,245,85,8
    7,245,85,87,245,85,87,245,85
    ,87,245,2330
25  1450 DATA 85,87,245,85,87,24
    5,85,87,245,85,87,245,85,125
    ,245,85,2208
7E  1460 DATA 127,117,85,85,85,8
    5,0,0,0,0,0,0,0,0,0,0,584
10  1470 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0,0
3D  1480 DATA 0,0,0,0,0,0,0,0,32
    ,0,128,32,0,128,37,85,442
CC  1490 DATA 64,37,85,80,37,85,
    80,47,255,240,37,105,92,5,17
    0,87,1506
A4  1500 DATA 6,170,149,6,150,14
    9,0,150,0,0,170,0,0,40,0,214
    ,1204
```

```
68  1510 DATA 0,0,0,0,0,0,0,0,0,0,
    0,0,0,32,0,0,32,64
CD  1520 DATA 0,0,32,0,0,32,0,0,
    32,0,0,32,0,0,21,85,234
B7  1530 DATA 64,21,85,64,21,255
    ,240,23,85,80,29,105,80,245,
    170,80,1647
4B  1540 DATA 86,170,168,86,150,
    168,0,150,0,0,170,0,0,40,0,1
    32,1320
23  1550 DATA 0,0,0,0,0,0,0,0,0,0,
    5,85,85,6,233,186,6,606
B1  1560 DATA 233,186,38,233,186
    ,38,233,186,38,233,186,38,23
    3,85,38,233,2417
85  1570 DATA 85,38,233,186,38,2
    33,186,38,233,186,6,233,186,
    6,233,186,2306
41  1580 DATA 6,233,186,5,85,85,
    0,0,0,0,0,0,0,0,0,44,644
05  1590 DATA 0,0,0,0,0,0,0,0,0,0,
    101,85,88,103,255,216,101,94
    9
DB  1600 DATA 85,216,101,85,216,
    101,85,216,101,85,216,101,85
    ,216,101,85,2095
14  1610 DATA 216,101,85,216,101
    ,85,216,101,85,216,101,85,21
    6,101,85,216,2226
75  1620 DATA 103,255,216,101,85
    ,88,0,0,0,0,0,0,0,0,0,0,848
1B  1630 DATA 0,0,0,0,0,0,0,0,0,0,
    2,170,170,10,251,254,11,868
6D  1640 DATA 251,254,43,251,254
    ,43,239,254,175,239,254,175,
    239,254,85,85,3095
E1  1650 DATA 85,85,85,85,85,85,
    85,213,85,85,213,85,85,170,1
    70,170,1871
BA  1660 DATA 90,165,85,27,229,8
    5,11,224,0,10,160,0,2,128,0,
    6,1222
FF  1670 DATA 0,0,0,0,0,0,0,0,0,0,
    168,0,0,252,0,0,255,675
A5  1680 DATA 0,0,255,0,0,255,19
    2,0,255,192,0,255,240,0,85,8
    5,1814
59  1690 DATA 84,85,85,84,85,85,
    85,85,85,85,85,85,85,85,170,170
    ,149,1592
79  1700 DATA 85,90,166,85,91,22
    4,0,11,224,0,10,160,0,2,128,
    115,1391
80  1710 DATA 0,0,0,0,0,0,0,0,0,0,
    165,85,85,111,239,254,123,10
    62
56  1720 DATA 251,254,126,170,17
    0,126,170,170,126,170,170,12
    6,170,170,126,170,2665
FC  1730 DATA 170,126,170,170,12
    6,170,170,126,170,170,126,17
    0,170,123,251,254,2662
3D  1740 DATA 111,239,254,165,85
    ,85,0,0,0,0,0,0,0,0,0,37,976

58  1750 DATA 0,0,0,0,0,0,0,0,0,0,
    85,85,84,255,117,85,253,964
F7  1760 DATA 245,85,171,245,85,
    171,245,85,171,245,85,171,24
    5,85,171,245,2750
41  1770 DATA 85,171,245,85,171,
    245,85,171,245,85,171,245,85
    ,253,245,85,2672
16  1780 DATA 255,117,85,85,85,8
    4,0,0,0,0,0,0,0,0,0,0,255,966
44  1790 DATA 0,0,0,0,0,0,0,0,0,0,
    0,21,85,0,175,127,0,408
4E  1800 DATA 191,127,2,191,127,
    2,191,127,10,255,127,10,255,
    127,21,85,1848
91  1810 DATA 85,21,85,85,21,85,
    85,21,85,85,21,105,85,21,170
    ,85,1145
7E  1820 DATA 21,170,85,5,190,85
    ,0,190,0,0,170,0,0,40,0,51,1
    007
27  1830 DATA 0,0,0,0,0,0,0,0,0,0,
    64,0,0,192,0,0,240,496
73  1840 DATA 0,0,240,0,0,252,0,
    0,252,0,0,255,0,0,85,85,1169

47  1850 DATA 64,85,85,80,85,85,
    80,85,85,80,85,105,80,85,170
    ,80,1419
D9  1860 DATA 85,170,64,85,190,0
    ,0,190,0,0,170,0,0,40,0,158,
    1152
4B  1870 DATA 0,0,0,0,0,0,0,0,0,0,
    21,85,85,26,255,127,30,629
F1  1880 DATA 175,127,31,149,85,
    31,149,85,31,149,85,31,149,8
    5,31,149,1542
FC  1890 DATA 85,31,149,85,31,14
    9,85,31,149,85,31,149,85,30,
    175,127,1477
64  1900 DATA 26,255,127,21,85,8
    5,0,0,0,0,0,0,0,0,0,254,853
CA  1910 DATA 0,0,0,0,0,0,0,0,0,0,
    85,85,64,247,85,80,223,869
F3  1920 DATA 85,80,127,85,80,12
    7,85,80,127,85,80,127,85,80,
    127,85,1545
10  1930 DATA 80,127,85,80,127,8
    5,80,127,85,80,127,85,80,223
    ,85,80,1636
B3  1940 DATA 247,85,80,85,85,64
    ,0,0,0,0,0,0,0,0,0,44,690
6C  1950 DATA 0,0,0,0,0,0,0,0,0,0,
    0,1,85,0,5,253,0,344
6D  1960 DATA 5,253,0,23,253,0,2
    3,253,0,95,253,5,95,253,21,8
    5,1617
F2  1970 DATA 85,85,85,85,85,85,
    85,85,85,85,86,149,85,90,165
    ,85,1510
23  1980 DATA 90,165,85,27,229,8
    5,11,224,0,10,160,0,2,128,0,
    204,1420
CB  1990 DATA 0,0,0,0,0,0,0,0,0,0,
    84,0,0,168,0,0,255,507
02  2000 DATA 0,0,255,0,0,255,19
    2,0,255,192,0,255,240,0,85,8
    5,1814
B4  2010 DATA 0,85,85,84,85,85,8
    5,85,85,85,85,86,149,85,90,1
    65,1424
C8  2020 DATA 85,90,166,85,91,22
    4,0,11,224,0,10,160,0,2,128,
    82,1358
1C  2030 DATA 0,0,0,0,0,0,0,0,0,0,
    21,85,85,85,85,255,85,701
C6  2040 DATA 95,127,85,95,213,8
    5,95,213,85,95,213,85,95,213
    ,85,95,1974
65  2050 DATA 213,85,95,213,85,9
    5,213,85,95,213,85,95,213,85
    ,95,127,2092
E2  2060 DATA 85,85,255,21,85,85
    ,0,0,0,0,0,0,0,0,0,254,870
2E  2070 DATA 0,0,0,0,0,0,0,0,0,0,
    85,85,84,255,117,85,253,964
F9  2080 DATA 245,85,87,245,85,8
    7,245,85,87,245,85,87,245,85
    ,87,245,2330
16  2090 DATA 85,87,245,85,87,24
    5,85,87,245,85,87,245,85,253
    ,245,85,2336
1E  2100 DATA 255,117,85,85,85,8
    4,0,0,0,0,0,0,0,0,0,0,711
95  2110 DATA 0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0,0,0
B5  2120 DATA 0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,128,0,85,213
4C  2130 DATA 160,5,85,85,85,85,
    85,85,85,85,85,105,85,255,17
    0,255,1800
0C  2140 DATA 255,170,255,21,190
    ,85,0,190,85,0,170,0,0,40,0,
    33,1494
FD  2150 DATA 0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0,0,0
A6  2160 DATA 0,0,48,0,0,48,0,0,
    60,0,0,60,0,0,63,0,279
05  2170 DATA 0,85,80,0,85,85,0,
    85,85,80,85,105,84,255,170,2
    55,1539
E9  2180 DATA 255,170,255,85,190
    ,84,85,190,0,0,170,0,0,40,0,
    172,1696
69  2190 DATA 0,0,0,0,0,0,0,0,0,0,
    21,85,85,85,85,186,85,632
6B  2200 DATA 85,186,85,85,186,8
    5,85,186,85,85,186,85,85,186
    ,85,85,1865
93  2210 DATA 85,85,85,186,85,85
    ,186,85,85,186,85,85,186,85,
    85,186,1865
27  2220 DATA 85,85,186,21,85,85
    ,0,0,0,0,0,0,0,0,0,210,757
DE  2230 DATA 0,0,0,0,0,0,0,0,0,0,
    85,85,84,87,85,85,95,606
29  2240 DATA 85,85,127,85,85,12
    7,85,85,127,85,85,127,85,85,
    127,85,1570
B3  2250 DATA 85,127,85,85,127,8
    5,85,127,85,85,127,85,85,95,
    85,85,1538
01  2260 DATA 87,85,85,85,85,84,
    0,0,0,0,0,0,0,0,0,1,512
75  2270 DATA 0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0
D7  2280 DATA 0,0,0,1,85,0,7,255
    ,0,31,255,64,95,255,21,85,11
    54
55  2290 DATA 255,5,85,85,5,85,8
    5,21,85,85,21,105,85,85,170,
    85,1347
51  2300 DATA 85,170,85,21,190,8
    5,0,190,85,0,170,0,0,40,0,14
    ,1135
5C  2310 DATA 0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0
EA  2320 DATA 0,0,64,0,0,240,0,0
    ,252,0,0,252,0,0,255,0,1063
A9  2330 DATA 0,85,80,0,85,84,0,
    85,85,0,85,105,64,85,170,80,
    1093
0A  2340 DATA 85,170,84,85,190,8
    4,85,190,80,0,170,0,0,40,0,1
    72,1435
C8  2350 DATA 0,0,0,0,0,0,0,0,0,0,
    81,85,85,85,213,255,85,889
BA  2360 DATA 215,255,85,245,85,
    85,245,85,85,245,85,85,245,8
    5,85,245,2460
4D  2370 DATA 85,85,245,85,85,24
    5,85,85,245,85,85,245,85,85,
    215,255,2300
BB  2380 DATA 85,213,255,81,85,8
    5,0,0,0,0,0,0,0,0,0,8,812
4C  2390 DATA 0,0,0,0,0,0,0,0,0,0,
    85,85,80,247,85,84,223,889
1B  2400 DATA 85,84,127,85,84,12
    7,85,84,127,85,84,127,85,84,
    127,85,1565
3F  2410 DATA 84,127,85,84,127,8
    5,84,127,85,84,127,85,84,223
    ,85,84,1660
4E  2420 DATA 247,85,84,85,85,80
    ,0,0,0,0,0,0,0,0,0,254,920
D4  2430 DATA 0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0
C2  2440 DATA 0,0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0
17  2450 DATA 0,0,0,0,0,0,5,63,0
    ,85,63,5,85,63,43,213,625
```

```
62  2460 DATA 63,170,245,10,170,
    245,2,170,245,0,170,250,0,40
    ,0,224,2004
3C  2470 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0
2A  2480 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0
65  2490 DATA 0,0,0,0,128,0,0,16
    0,0,0,80,0,0,95,0,0,463
A0  2500 DATA 95,232,0,91,170,64
    ,91,170,80,170,170,84,0,40,0
    ,77,1534
34  2510 DATA 0,0,0,0,0,0,63,170
    ,245,63,170,245,63,170,245,6
    3,1497
91  2520 DATA 40,213,63,37,125,6
    3,165,87,63,169,85,63,170,85
    ,63,169,1660
2E  2530 DATA 85,63,165,87,63,37
    ,125,63,40,213,63,170,245,63
    ,170,245,1897
07  2540 DATA 63,170,245,63,170,
    245,0,0,0,0,0,0,0,0,0,37,993

71  2550 DATA 0,0,0,0,0,0,92,170
    ,20,92,170,20,92,170,20,95,9
    41
67  2560 DATA 40,20,239,85,84,12
    7,213,84,95,245,84,95,253,84
    ,127,245,2120
50  2570 DATA 84,239,213,84,95,8
    5,84,95,40,20,92,170,20,92,1
    70,20,1603
27  2580 DATA 92,170,20,92,170,2
    0,0,0,0,0,0,0,0,0,0,8,572
49  2590 DATA 0,0,0,0,0,0,0,0,0,0,
    0,10,170,0,46,254,0,480
4C  2600 DATA 174,254,0,190,254,
    2,190,254,2,190,254,2,170,17
    0,10,170,2286
02  2610 DATA 170,10,170,170,42,
    170,170,42,170,170,42,170,17
    0,42,170,170,2048
64  2620 DATA 10,170,170,2,250,1
    70,2,248,0,2,168,0,0,160,0,2
    7,1379
53  2630 DATA 0,0,0,0,0,0,2,0,0,
    170,0,0,255,0,0,255,682
DC  2640 DATA 0,0,255,192,0,255,
    192,0,255,192,0,170,170,0,17
    0,170,2021
40  2650 DATA 160,170,170,168,17
    0,170,168,170,170,168,170,17
    0,168,170,170,168,2700
F9  2660 DATA 170,170,168,170,17
    5,160,0,47,128,0,42,128,0,10
    ,0,122,1490
DC  2670 DATA 0,0,0,0,0,0,0,0,0,
    10,170,170,42,190,254,42,878

53  2680 DATA 170,170,42,170,170
    ,42,170,170,42,234,170,42,23
    4,170,42,234,2272
F3  2690 DATA 170,42,234,170,42,
    234,170,42,170,170,42,170,17
    0,42,170,170,2208
3D  2700 DATA 42,190,254,10,170,
    170,0,0,0,0,0,0,0,0,0,222,10
    58
47  2710 DATA 0,0,0,0,0,0,0,0,0,0,
    170,170,160,254,234,168,170,
    1326
FA  2720 DATA 234,168,170,234,16
    8,170,234,168,170,234,168,17
    0,234,168,170,234,3094
6B  2730 DATA 168,170,234,168,17
    0,234,168,170,234,168,170,23
    4,168,170,234,168,3028
CE  2740 DATA 254,234,168,170,17
    0,160,0,0,0,0,0,0,0,0,0,0,11
    56
```

PROGRAM: VEHICLES DISPLAY

```
85  10 REM************************
    ****
31  20 REM* SPRITE LIRBARY DISPL
    AY *
F6  30 REM*         VEHICLES
    *
CB  40 REM************************
    ****
06  50 POKE55,0:POKE56,40:X=X+1:
    IFX=1THENLOAD"VEHICLES",8,1
5C  60 P0=70:P1=150:P2=118:P3=15
    0:P4=200:P5=150:P6=248:P7=15
    0:S=160:E=199:D=250
2F  70 V=53248:PRINT"[CLS][26CD]
    [9CR][REV]F7 TO STOP ANIMATI
    ON"
96  80 POKEV+21,15:POKEV+23,15:P
    OKEV+28,15:POKEV+29,15:POKEV
    +32,3:POKEV+33,3
63  90 POKEV+37,0:POKEV+38,15:PO
    KEV+39,2:POKEV+40,2:POKEV+41
    ,2:POKEV+42,2:POKEV,P0
B7  100 POKEV+1,P1:POKEV+2,P2:PO
    KEV+3,P3:POKEV+4,P4:POKEV+5,
    P5:POKEV+6,P6:POKEV+7,P7
27  110 INPUT"[HOM][CD]START SPR
    ITE";S:INPUT"END SPRITE";E:I
    NPUT"DELAY";D
A9  120 FORSP=STOESTEP4:FORT=0TO
    D:NEXT:PRINT"[HOM]"TAB(23)"S
    PRITE NO.=";SP:POKE2040,SP
48  130 POKE2041,SP+1:POKE2042,S
    P+2:POKE2043,SP+3:NEXT:GETK$
    :IFK$="[F7]"THEN110
34  140 GOTO120
```

Instructions for entering ROM 80

1) Enter the program 'ROM80.BAS'
2) SAVE this to tape or disk.
   Do NOT RUN it.
3) Enter the following command:
   POKE43,0:POKE44,16:POKE4095,0
   :NEW
4) Now LOAD and RUN 'ROM80.BAS'
5) When finished enter the follow
   ing:POKE43,1:POKE44,8:RUN

PROGRAM: ROM80.BAS

```
E4  10 BL=88:LN=50:SA=2049
5B  20 FOR L=0 TO BL:CX=0:FOR D=
    0 TO 15:READ A:CX=CX+A:POKE
    SA+L*16+D,A:NEXT D
A5  30 READ A:IF A><CX THENPRINT
    "ERROR IN LINE";LN+(L*10):ST
    OP
40  40 NEXT L:END
7A  50 DATA 17,8,0,0,158,50,48,5
    5,50,32,171,32,72,67,69,0,82
    9
06  60 DATA 0,0,0,0,0,0,0,162,0,
    160,160,134,247,132,248,160,
    1403
83  70 DATA 224,134,249,132,250,
    162,32,160,0,177,247,145,247
    ,177,249,145,2730
11  80 DATA 249,200,208,245,230,
    248,230,250,202,208,238,162,
    242,160,8,134,3214
B8  90 DATA 247,132,248,160,0,17
    7,247,133,249,32,107,8,177,2
    47,240,33,2437
13  100 DATA 133,250,32,107,8,17
    7,247,72,32,107,8,104,201,98
    ,240,229,2045
68  110 DATA 145,249,230,249,208
    ,239,230,250,208,235,230,247
    ,208,2,230,248,3408
70  120 DATA 96,169,231,133,1,16
    2,0,189,63,13,240,6,32,210,2
    55,232,2032
F5  130 DATA 208,245,32,228,255,
    240,251,201,78,208,8,120,169
    ,229,133,1,2606
82  140 DATA 108,252,255,201,89,
    208,235,120,169,229,133,1,16
    0,0,162,224,2546
43  150 DATA 195,247,134,248,162
    ,85,132,249,70,250,160,55,17
    7,247,145,249,2805
04  160 DATA 32,82,79,77,32,56,4
    8,32,66,89,32,74,133,80,88,1
    89,1189
82  170 DATA 79,13,133,247,189,9
    8,13,240,10,133,248,189,118,
    13,145,247,2115
FD  180 DATA 232,208,236,162,8,3
    2,186,255,169,3,162,66,160,1
    3,32,189,2113
2C  190 DATA 255,162,0,160,32,13
    4,247,132,248,169,247,160,64
    ,32,216,255,2513
8D  200 DATA 96,68,229,169,32,13
    3,219,169,0,160,200,162,8,32
    ,198,230,2105
3B  210 DATA 173,134,2,32,231,23
    0,169,0,133,219,169,0,160,96
    ,162,32,1942
E0  220 DATA 32,198,230,234,234,
    98,108,229,96,164,211,132,22
    1,32,127,229,2575
10  230 DATA 164,221,177,219,96,
    32,111,229,201,32,96,164,214
    ,185,240,236,2617
B6  240 DATA 72,41,240,133,219,1
    04,41,15,9,200,133,220,96,17
    3,33,208,1937
97  250 DATA 77,255,207,41,15,96
    ,98,182,230,230,211,164,211,
    192,80,208,2497
AE  260 DATA 7,160,0,132,211,32,
    42,232,96,133,217,132,218,16
    5,219,160,2156
F0  270 DATA 0,145,217,200,192,2
    50,208,249,152,24,101,217,13
    3,217,144,2,2451
DD  280 DATA 230,218,202,208,232
    ,96,142,134,2,138,10,10,10,1
    0,133,219,1994
4A  290 DATA 173,33,208,41,15,5,
    219,133,219,120,169,225,133,
    1,169,0,1863
ED  300 DATA 76,181,232,0,166,21
    4,208,7,134,211,104,104,76,1
    68,230,202,2313
5B  310 DATA 134,214,160,79,132,
    211,96,98,39,231,76,165,231,
    201,13,208,2288
71  320 DATA 3,76,57,232,201,32,
    144,16,201,96,144,4,41,223,2
    08,2,1680
```

```
EA  330 DATA 41,63,32,132,230,76
    ,147,230,166,216,240,3,76,15
    1,230,201,2234
D1  340 DATA 20,208,33,152,208,6
    ,32,1,231,76,105,231,136,132
    ,211,200,1982
7A  350 DATA 32,111,229,136,32,9
    7,233,200,192,79,208,243,169
    ,32,32,97,2122
80  360 DATA 233,76,168,230,166,
    212,240,3,76,151,230,201,18,
    208,2,133,2347
DF  370 DATA 199,201,19,208,3,32
    ,102,229,201,29,208,15,192,7
    9,240,6,1963
3E  380 DATA 200,132,211,76,168,
    230,162,0,76,65,232,201,17,2
    08,3,76,2057
B1  390 DATA 67,232,32,203,232,7
    6,68,236,41,127,201,127,208,
    2,169,94,2115
7C  400 DATA 201,32,144,3,76,145
    ,230,201,13,208,3,76,57,232,
    166,212,1999
E7  410 DATA 208,44,201,20,208,3
    6,160,79,32,111,229,201,32,2
    08,24,196,1989
8C  420 DATA 211,240,20,136,32,1
    11,229,200,32,97,233,136,196
    ,211,208,243,2535
7B  430 DATA 169,32,32,97,233,23
    0,216,76,168,230,166,216,240
    ,5,9,64,2183
37  440 DATA 76,151,230,201,17,2
    08,9,166,214,240,2,198,214,7
    6,168,230,2400
02  450 DATA 201,18,208,4,169,0,
    133,199,201,29,208,15,152,24
    0,6,136,1919
71  460 DATA 132,211,76,168,230,
    32,1,231,76,168,230,201,19,2
    08,6,32,2021
77  470 DATA 68,229,76,168,230,9
    ,128,32,203,232,76,79,236,70
    ,201,166,2203
52  480 DATA 214,232,224,25,208,
    3,32,234,232,134,214,96,162,
    0,134,216,2360
46  490 DATA 134,199,134,212,134
    ,211,32,42,232,76,168,230,16
    9,127,141,0,2241
7E  500 DATA 220,173,1,220,201,2
    51,240,249,162,80,160,200,13
    4,217,132,218,2858
5C  510 DATA 162,0,134,219,132,2
    20,162,8,160,0,177,217,145,2
    19,200,192,2347
2B  520 DATA 240,208,247,24,165,
    217,105,240,133,217,144,2,23
    0,218,24,165,2579
43  530 DATA 219,105,240,133,219
    ,144,2,230,220,202,208,220,1
    62,79,169,32,2584
57  540 DATA 157,128,207,202,16,
    250,162,64,160,97,134,217,13
    2,218,162,0,2306
3C  550 DATA 160,96,134,219,132,
    220,32,223,207,138,157,0,126
    ,157,160,126,2287
0E  560 DATA 232,224,160,208,245
    ,166,214,96,160,92,162,4,32,
    198,230,169,2592
15  570 DATA 229,133,1,88,165,21
    9,141,255,207,96,98,234,232,
    76,73,232,2479
8E  580 DATA 120,169,225,133,1,1
    62,0,160,208,134,217,132,218
    ,160,216,134,2389
4C  590 DATA 219,132,220,160,196
    ,134,221,132,222,162,4,160,0
    ,177,217,32,2388
23  600 DATA 38,233,177,219,32,3
    8,233,165,223,145,221,200,20
    8,239,230,218,2819
61  610 DATA 230,220,230,222,20
    ,208,230,240,14,134,2,162,4,
    10,10,38,2156
E5  620 DATA 223,202,208,249,166
    ,2,96,169,229,133,1,88,162,4
    7,189,231,2395
D5  630 DATA 233,157,208,207,202
    ,16,247,169,224,141,72,196,1
    69,230,141,78,2690
72  640 DATA 196,169,14,141,72,1
    98,169,78,141,78,198,169,204
    ,141,137,197,2302
95  650 DATA 76,33,234,0,133,221
    ,132,222,32,127,229,165,221,
    164,222,145,2356
5B  660 DATA 219,165,220,41,7,9,
    24,133,220,165,222,41,254,24
    ,101,219,2064
16  670 DATA 133,219,144,2,230,2
    20,6,219,38,220,6,219,38,220
    ,165,221,2300
65  680 DATA 9,128,133,217,169,2
    4,133,218,6,217,38,218,6,217
    ,38,218,1989
2E  690 DATA 6,217,38,218,160,0,
    173,24,208,41,2,8,177,217,40
    ,240,1769
1B  700 DATA 4,10,10,10,10,41,24
    0,36,221,16,2,73,240,133,223
    ,165,1434
1F  710 DATA 222,74,176,11,32,20
    8,207,41,15,5,223,145,219,14
    4,17,70,1809
B9  720 DATA 223,70,223,70,223,7
    0,223,32,208,207,41,240,5,22
    3,145,219,2422
95  730 DATA 200,192,8,208,193,1
    65,221,164,222,96,120,169,22
    9,133,1,177,2498
85  740 DATA 219,72,169,229,133,
    1,104,88,96,120,169,229,133,
    1,162,30,1955
72  750 DATA 160,0,177,217,145,2
    19,200,208,249,230,218,230,2
    20,202,208,242,3125
76  760 DATA 169,229,133,1,88,96
    ,168,169,2,133,205,234,234,2
    34,152,164,2411
30  770 DATA 211,76,97,233,169,2
    55,141,189,196,169,153,141,1
    90,196,108,0,2524
2D  780 DATA 160,98,240,236,0,80
    ,160,240,65,145,225,50,130,2
    10,35,115,2189
6E  790 DATA 195,20,100,180,5,85
    ,165,245,70,150,230,55,135,9
    8,125,228,2086
A0  800 DATA 32,82,79,77,32,56,4
    8,32,66,89,32,74,32,80,32,77
    ,920
E8  810 DATA 69,89,69,82,32,32,3
    2,98,6,229,80,98,53,229,11,9
    8,1307
5B  820 DATA 2,230,160,79,132,20
    8,32,121,229,234,98,33,230,2
    34,234,234,2490
6F  830 DATA 98,58,230,32,109,22
    9,234,98,214,232,32,227,230,
    98,68,234,2423
05  840 DATA 32,111,229,234,234,
    98,79,234,32,145,229,240,6,1
    73,134,2,2212
31  850 DATA 32,231,230,98,202,2
    36,187,98,209,236,120,98,217
    ,236,12,15,2457
11  860 DATA 98,255,252,76,237,2
    32,98,136,253,162,0,160,92,9
    8,204,253,2606
B8  870 DATA 6,98,214,253,229,98
    ,157,230,198,216,234,234,234
    ,32,19,234,2686
6E  880 DATA 32,182,230,165,216,
    240,2,70,212,104,168,98,0,0,
    13,69,1801
1B  890 DATA 80,82,79,77,32,40,3
    6,50,48,48,48,41,63,0,239,53
    ,1016
15  900 DATA 115,240,14,248,182,
    189,94,150,158,169,172,204,2
    14,136,137,138,2560
5F  910 DATA 139,40,41,41,41,42,
    38,40,40,37,40,40,40,40,61,6
    1,781
59  920 DATA 61,61,61,61,0,227,2
    31,56,231,231,227,220,231,22
    4,225,224,2571
90  930 DATA 254,254,4,231,152,1
    70,0,0,0,0,0,0,0,0,0,0,1065
```

PROGRAM: BOOT

```
77  10 REM QUESTIONAIRE 1 BOOT
1F  20 POKE53280,0:POKE53281,0:P
    RINTCHR$(144)
1E  30 POKE631,19:POKE632,13:POK
    E633,82:POKE634,117:POKE635,
    13:POKE198,5
A0  40 PROG$="QUESTIONAIRE 1"
5B  50 PRINT"[CLR][CSO]"+CHR$(34
    )+PROG$+CHR$(34)+",8"
50  60 PRINTCHR$(5)
16  70 PRINT"[RIGHT6,DOWN11]QUES
    TIONAIRE 1 NOW LOADING..."
38  80 PRINTCHR$(144)
```

PROGRAM: QUESTIONAIRE 1

```
53  10 POKE808,251:REM DISABLE S
    TOP KEY
37  20 POKE774,226:POKE775,252:R
    EM LIST COLD START
D9  30 POKE53280,2:POKE53281,0:P
    RINT"[CLR]"
A1  40 IFPEEK(49152)=120THENGOTO
    90
4A  50 IFPEEK(49152)<>120THENT=0
    :FORI=49152TO49298:READA:T=T
    +A:POKEI,A:NEXT
02  60 IFT<>17877THENPRINT"DATA
    WRONG":END
75  70 FORI=0TO24:READA:POKE4929
    9+I,A:NEXTI
C5  80 FORI=0TO447:READA:POKE159
    36+I,A:NEXTI
A4  90 A$="[SPC7]** **  * *****
     **  *  **":GOSUB220
38  100 A$="[SPC8]** **  **[SPC4
    ]*  *  **  * ":GOSUB220
10  110 A$="[SPC9]*  **  **[SPC3
    ]*  **  ** **":GOSUB220
FC  120 A$="[SPC9]*[SPC3]**  *
    *  *** *** **":GOSUB220
8C  130 A$="[SPC9]*[SPC3]**  *[S
    PC3]*  *********":GOSUB220
F6  140 A$="[SPC8]**[SPC3]*  **[
    SPC3]*  ** **  **":GOSUB220
8C  150 A$="[SPC7]******  ******
```

```
      **  *  **":GOSUB220
03  160 PRINT"[DOWN,YELLOW]"TAB(
    7)"************************
    *"
D4  170 A$="[SPC7,RVSON]********
    *PRESENTS*********":GOSUB220

D6  180 PRINT"[YELLOW]"TAB(7)"**
    ************************"
BD  190 POKE198,0:FORI=0TO6::PRI
    NT:NEXTI:PRINT"[SPC6]<<PRESS
     A KEY TO CONTINUE>>"
87  200 GETA$:IFA$=""THEN200
EE  210 GOTO230
D8  220 FORT=1TOLEN(A$):PRINT"[W
    HITE]"MID$(A$,T,1);:FORT1=1T
    O2:NEXTT1,T:PRINT:RETURN
70  230 POKE53280,5:POKE53281,0
6E  240 PRINT"[CLR,DOWN2,RED] [C
    @38]"
BD  250 PRINTTAB(1)"[BLUE]*[SS]*
    [SS]*[SS]*[SS]*[SS]*[SS]*[SS
    ]*[SS]*[SS]*[SS]**[SS]*[SS]*
    [SS]*[SS]*[SS]*[SS]*[SS]*[SS
    ]*"
EE  260 PRINT"[RED] [CT38]"
38  270 PRINT"[DOWN6,RED] [C@38]
    "
68  280 PRINTTAB(1)"[BLUE]*[SS]*
    [SS]*[SS]*[SS]*[SS]*[SS]*[SS
    ]*[SS]*[SS]*[SS]**[SS]*[SS]*
    [SS]*[SS]*[SS]*[SS]*[SS]*[SS
    ]*"
0C  290 PRINT"[RED] [CT38]"
E1  300 PRINTTAB(10)"[RED,DOWN3,
    CP21]"
FF  310 PRINTTAB(10)"[RVSON,YELL
    OW,SPC3]D.WARNER[SPC3]1987[S
    PC3]"
52  320 PRINTTAB(10)"[RED,CY21]"

76  330 PRINTTAB(7)"[DOWN,CYAN,S
    PC3]PRESS 'C' TO CONTINUE":P
    OKE198,0
2E  340 POKE53280,0:POKE53281,0:
    PRINTCHR$(5):SD=249
3E  350 POKE53269,255:REM TURN O
    N 8 SPRITES
BA  360 FORSP=2040TO2046:POKESP,
    SD:SD=SD+1:NEXTSP:REM SPRITE
     POINTERS
FC  370 FORC=53287TO53294:POKEC,
    0:NEXTC:REM SPRITE COLOUR
7C  380 POKE53277,255:POKE53271,
    255:REM EXPAND 8 SPRITES
CE  390 POKE53248,45:POKE53249,9
    3: REMSPR0 XY
B1  400 POKE53250,78:POKE53251,9
    3: REMSPR1 XY
9E  410 POKE53252,126:POKE53253,
    93:REMSPR2 XY
A4  420 POKE53254,174:POKE53255,
    93:REMSPR3 XY
57  430 POKE53256,222:POKE53257,
    93:REMSPR4 XY
CF  440 POKE53264,96:REM MSB SPR
    5 & SPR6
71  450 POKE53258,14:POKE53259,9
    3:REMSPR5 XY
ED  460 POKE53260,37:POKE53261,9
    3:REMSPR6 XY
01  470 POKE820,11:SYS49299:GOSU
    B580:REM SPRITE COLOUR
63  480 POKE820,11:SYS49299:GOSU
    B580:REM SPRITE COLOUR
BE  490 POKE820,12:SYS49299:GOSU
    B580:REM SPRITE COLOUR
D3  500 POKE820,15:SYS49299:GOSU
    B580:REM SPRITE COLOUR
08  510 POKE820,7:SYS49299:GOSUB
    580:REM SPRITE COLOUR
93  520 POKE820,1:SYS49299:GOSUB
    580:REM SPRITE COLOUR
33  530 POKE820,7:SYS49299:GOSUB
    580:REM SPRITE COLOUR
1A  540 POKE820,15:SYS49299:GOSU
    B580:REM SPRITE COLOUR
8B  550 POKE820,12:SYS49299:GOSU
    B580:REM SPRITE COLOUR
69  560 GETA$:IFA$="C"THENPOKE53
    269,0:GOTO590
51  570 IFA$<>"C"THEN470
AC  580 FORI=0TO40:NEXTI:RETURN:
    REM TIME DELAY
81  590 PRINT"[CLR]":POKE53280,0
    :POKE53281,0:PRINTCHR$(5)
EC  600 POKE198,0:PRINT:INPUT"[W
    HITE,DOWN]DO YOU WANT A CLOC
    K ON SCREEN[RIGHT2,CB,LEFT3]
    ";Z$
06  610 IFZ$<>"Y"THEN740
CF  620 PRINT"[CLR]ENTER TIME(A/
    P.HR.MN.SE)";:INPUT"[WHITE,R
    IGHT2,CB,LEFT3]";A$:IFLEN(A$
    )<10THEN620
B2  630 H$="A":IFLEFT$(A$,1)="P"
    THENH$="P"
6D  640 HO=1:HU=VAL(MID$(A$,3,2)
    ):IFHU>0ANDHU<13THENHO=HU
6C  650 MI=1:MA=VAL(MID$(A$,6,2)
    ):IFMA>0ANDMA<60THENMI=MA
C4  660 SE=1:SE=VAL(MID$(A$,9,2)
    ):IFS>0ANDS<60THENSE=S
D7  670 IFHO>9THENHO=HO+6
B9  680 IFMI>9THENMI=INT(MI/10)*
    16+MI-INT(MI/10)*10
1D  690 IFSE>9THENSE=INT(SE/10)*
    16+SE-INT(SE/10)*10
21  700 IF H$="P"THENHO=HO+128
11  710 POKE56331,HO:POKE56330,M
    I:POKE56329,SE:POKE56328,0
39  720 POKE821,13:SYS49152:GOTO
    740
48  730 POKE631,VA:POKE198,1
73  740 CLR:GOSUB910
8D  750 IFFLAG=1THEN770
FE  760 GOSUB1150
8D  770 GOSUB1400
8D  780 GOSUB1460
FE  790 POKE53280,8:POKE53281,8
D5  800 IFSC=XTHENGOSUB2300
05  810 PRINT"[CLR,DOWN2]FROM A
    POSSIBLE TOTAL OF ";X;"QUEST
    IONS"
AC  820 PRINT:PRINT"[SPC7]YOU HA
    D ";SC;" CORRECT ANSWERS"
D1  830 PRINT:PRINT"[SPC7]OR ";(
    SC/1)*(1/X)*(100/1);"%"
CD  840 POKE198,0:PRINT:PRINT"[S
    PC7]<<PRESS A KEY TO CONTINU
    E>>"
0D  850 GETA$:IFA$=""THEN850
6E  860 GOTO910
A3  870 PRINT"[CLR]"
EF  880 CLR
29  890 DIMQ$(X):DIMA$(X),B$(X),
    C$(X),D$(X)
91  900 DIMR(X):DIMR$(X):RETURN
AC  910 PRINT"[CLR,WHITE]":POKES
    3281,2:POKE53280,0:PRINT"[SP
    C15,C@9]"
EA  920 PRINT"[SPC15,RVSON]MAIN
    MENU[RVSOFF]"
22  930 PRINT:PRINT"[SPC11]1. EN
    TER NEW DATA"
13  940 PRINT:PRINT"[SPC11]2. LO
    AD QUESTION FILE"
9D  950 PRINT:PRINT"[SPC11]3. SA
    VE QUESTION FILE"
12  960 PRINT:PRINT"[SPC11]4. DI
    SK UTILITIES"
B8  970 PRINT:PRINT"[SPC11]5. RU
    N QUESTIONS"
F8  980 PRINT:PRINT"[SPC11]6. QU
    IT FOR GOOD"
F4  990 GETA$:IFA$=""THEN990
29  1000 IFA$="1"AND EN=1THENVA=
    49:GOTO730
FD  1010 IFA$="1"ANDLO=1THENVA=4
    9:GOTO730
57  1020 IFA$="1"THENGOSUB760
FC  1030 IFA$="2"AND SA=1THENVA=
    50:GOTO730
A5  1040 IFA$="2"ANDLO=1THENVA=5
    0:GOTO730
39  1050 IFA$="2"ANDEN=1THENVA=5
    0:GOTO730
12  1060 IFA$="2"THENGOSUB1830:G
    OSUB1780:FLAG=1:RETURN
D7  1070 IFA$="3"ANDQ=0THENPRINT
    "[CLR]THERE ARE NONE TO SAVE
    !":FORI=0TO1000:NEXT:GOTO910

7C  1080 IFA$="3"THENSA=1:GOSUB1
    690
A8  1090 IFA$="4"THENGOSUB2390
4F  1100 IFA$="5"ANDRU=0THENPRIN
    T"[CLR]THERE ARE NONE TO RUN
    !":FORI=0TO1000:NEXT:GOTO910

8A  1110 IFA$="5"AND RU=1 THEN78
    0
43  1120 IFA$="6"THEN1940
8F  1130 IFA$<>"N"THEN990
F6  1140 RETURN
99  1150 GOSUB1900
82  1160 POKE53280,6:POKE53281,9

15  1170 FORC=1TOX
EC  1180 PRINT"[CLR]":PRINT:PRIN
    T
2E  1190 PRINT"PLEASE ENTER QUES
    TION NO";C
25  1200 PRINT:INPUT"[WHITE,RIGH
    T2,CB,LEFT3]";I$
37  1210 PRINT:PRINT"[SPC5]IS TH
    IS QUESTION OK? Y/N"
36  1220 GETY$:IFY$=""THEN1220
C9  1230 IFY$="N"THEN1180
C9  1240 IFY$<>"Y"THEN1220
BC  1250 Q$(C)=I$
53  1260 PRINT"[CLR,DOWN]PLEASE
    INPUT THE MULTIPLE ANSWERS T
    O[SPC4]QUESTION NO:";C
FD  1270 PRINT:PRINT"Q. ";:P$=Q$
    (C):GOSUB1640
55  1280 PRINT"[HOME,DOWN6]":PRI
    NT"ANSWERS:-":PRINT
90  1290 INPUT"[WHITE]A.[RIGHT2,
    CB,LEFT3]";I$:A$(C)=I$
71  1300 PRINT:INPUT"[WHITE]B.[R
    IGHT2,CB,LEFT3]";I$:B$(C)=I$

97  1310 PRINT:INPUT"[WHITE]C.[R
    IGHT2,CB,LEFT3]";I$:C$(C)=I$

7D  1320 PRINT:INPUT"[WHITE]D.[R
    IGHT2,CB,LEFT3]";I$:D$(C)=I$

E4  1330 PRINT:PRINT:INPUT"[WHIT
    E]ENTER THE CORRECT ANSWER A
    ,B,C,D.[RIGHT2,CB,LEFT3]";I$

57  1340 IFASC(I$)<65ORASC(I$)>6
    8THENPRINT"[UP]";:GOTO1330
D5  1350 R$(C)=I$:PRINT:PRINT:PR
    INT"[SPC5]<<PRESS ANY KEY TO
     CONTINUE>>"
38  1360 GETA$:IFA$=""THEN1360
20  1370 NEXTC
5D  1380 Q=1:EN=1
FD  1390 RETURN
CF  1400 FORC=1TOX:R(P)=0:NEXTC:
    FORC=1TOX
86  1410 P=INT(RND(0)*X)+1
D4  1420 IFR(P)<>0THEN1410
```

```
BB  1430 R(P)=C
6A  1440 NEXTC
21  1450 RETURN
F5  1460 SC=0:RU=1
BF  1470 POKE53280,6:POKE53281,9

6B  1480 FORC=1TOX:PRINT"[CLR]":
    PRINT"QUESTION NO.";C:PRINT:
    P$=Q$(R(C)):GOSUB1640
55  1490 PRINT:PRINT:PRINT:PRINT
    "A. ";:P$=A$(R(C)):GOSUB1640

BD  1500 PRINT:PRINT"B. ";:P$=B$
    (R(C)):GOSUB1640
1D  1510 PRINT:PRINT"C. ";:P$=C$
    (R(C)):GOSUB1640
ED  1520 PRINT:PRINT"D. ";:P$=D$
    (R(C)):GOSUB1640
59  1530 PRINT:PRINT:PRINT:INPUT
    "[WHITE,DOWN]ENTER A,B,C,D.[
    RIGHT2,CB,LEFT3]";I$
3E  1540 IFASC(I$)<65ORASC(I$)>6
    8THENPRINT"[UP]";:GOTO1530
2A  1550 IFR$(R(C))=I$THENPRINT:
    PRINTSPC(15)I$;" IS CORRECT"
    :SC=SC+1:Q=8:GOSUB2110
94  1560 IFR$(R(C))=I$THENGOTO16
    00
BE  1570 PRINT:PRINTSPC(15)I$;"
    IS WRONG"
1D  1580 PRINTSPC(15)R$(R(C));"
    IS THE CORRECT ANSWER"
6C  1590 Q=4:GOSUB2110
33  1600 PRINT:PRINT"[SPC9]<<ANY
     KEY TO CONTINUE>>"
49  1610 GETA$:IFA$=""THEN1610
1B  1620 NEXTC
EA  1630 RETURN
E6  1640 IFLEN(P$)>80THEN1660
37  1650 FORN=1TOLEN(P$):PRINTMI
    D$(P$,N,1);:NEXTN:PRINT:RETU
    RN
B7  1660 N1=80
54  1670 IFMID$(P$,N1,1)<>" "THE
    N N1=N1-1:GOTO1670
02  1680 FORN=NTON1:PRINTMID$(P$
    ,N,1);:NEXTN:PRINT:P$=MID$(P
    $,N1+1):GOTO1640
40  1690 PRINT"[CLR,DOWN2]":INPU
    T"[WHITE,DOWN]ENTER FILENAME
    :[RIGHT2,CB,LEFT3]";I$
2A  1700 PRINT"[CLR]":PRINT"[SPC
    7]PLACE FILES DISK INTO DRIV
    E"
D3  1710 PRINT:PRINT"[SPC7]<<PRE
    SS SPACE TO CONTINUE>>"
39  1720 GETA$:IFA$=""THEN1720
72  1730 OPEN1,8,1,I$
54  1740 FORC=1TOX:PRINT#1,Q$(C)
    :PRINT#1,A$(C):PRINT#1,B$(C)
    :PRINT#1,C$(C)
FC  1750 PRINT#1,D$(C):PRINT#1,R
    $(C):NEXTC:CLOSE1
56  1760 IFSA=1THENSA=0:GOTO910
7E  1770 RETURN
3F  1780 PRINT:INPUT"[WHITE,DOWN
    ]ENTER FILENAME:[RIGHT2,CB,L
    EFT3]";I$
22  1790 OPEN1,8,0,I$:PRINT"[CLR
    ]":PRINT:PRINT"[SPC7]";I$;"
    IS NOW LOADING"
AD  1800 FORC=1TOX:INPUT#1,Q$(C)
    :INPUT#1,A$(C):INPUT#1,B$(C)
    :INPUT#1,C$(C)
D9  1810 INPUT#1,D$(C):INPUT#1,R
    $(C):NEXTC:CLOSE1
95  1820 LO=1:RETURN
3C  1830 PRINT"[CLR]":POKE53280,
    0:POKE53281,0:PRINTCHR$(5)
39  1840 GOSUB2500
D8  1850 PRINT
A8  1860 PRINT"[SPC6]PRESS D. TO
     VIEW DIRECTORY OF[SPC11]THI
    S OR ANOTHER DISK"
CF  1870 PRINT:PRINT"[SPC6]PRESS
     ANY KEY TO LOAD A FILE"
C7  1880 GETA$:IFA$=""THEN1880
29  1890 IFA$="D"THEN1840
82  1900 PRINT:INPUT"[WHITE,DOWN
    ,SPC6]HOW MANY QUESTIONS[RIG
    HT2,CB,LEFT3]";X
95  1910 IFX<=0THEN740
AB  1920 GOSUB890
1F  1930 RETURN
D9  1940 PRINT"[CLR]"
E0  1950 POKE53280,0:POKE53281,0
    :PRINTCHR$(5)
B7  1960 PRINT"[DOWN2] I WILL SE
    LF-DESTRUCT IN[SPC4]SECONDS!
    !":TI$="000000"
B2  1970 PRINTTAB(24)"[UP]"10-VA
    L(TI$)"[LEFT] ":IFVAL(TI$)<1
    0THEN1980
48  1980 PRINTTAB(24)"[UP]"10-VA
    L(TI$)"[LEFT] ":IFVAL(TI$)<1
    0THEN1980
9C  1990 PRINT"[CLR]":FORX=1TO10
    00
F9  2000 POKE53280,2:POKE53281,4
    :POKE53280,8
CD  2010 POKE53281,3:POKE53280,7
    :POKE53281,9
C1  2020 NEXTX
ED  2030 PRINT"[DOWN11,RIGHT18,C
    @5]"
2F  2040 PRINT"[SPC18,RVSON]BANG
    !"
1A  2050 POKE54296,15:POKE54278,
    240
41  2060 FORI=1TO80
A6  2070 POKE54276,17:POKE54273,
    99+100*RND(0)
33  2080 NEXT:POKE54276,0
50  2090 FORI=1TO2000:NEXTI
62  2100 PRINT"[CLR]":SYS64738
FD  2110 S=54272:W(1)=17:W(2)=33
    :W(3)=129
92  2120 FORZ=STOS+24:POKEZ,0:NE
    XTZ
10  2130 P=Q:W=2
6C  2140 POKES+24,15:POKES+5,15:
    POKES+4,W(W):POKES+6,15
11  2150 ONPGOSUB2170,2180,2190,
    2200,2210,2220,2230,2240,225
    0,2260,2270
85  2160 POKES+4,W(W)-1:POKES+5,
    0:POKES,0:POKES+1,0:RETURN
17  2170 FORZ=1TO75STEP.1:POKES+
    1,Z:NEXTZ:RETURN
F1  2180 FORZ=1TO75STEP.1:POKES+
    1,Z:POKES,Z:NEXTZ:RETURN
50  2190 FORZ=75TO5STEP-1:POKES+
    1,Z:POKES,Z:NEXTZ:RETURN
7D  2200 FORZ=1TO100:POKES+1,RND
    (1)*75:NEXTZ:RETURN
70  2210 FORZ=1TO200:POKES+1,ABS
    (TAN(Z)+5):NEXTZ:RETURN
46  2220 POKES+1,10:POKES,127:FO
    RZ=1TO15STEP.05:POKES+24,Z:N
    EXTZ:RETURN
38  2230 FORZ=1TO250STEP1:POKES+
    1,Z:POKES+1,255-Z:NEXTZ:RETU
    RN
77  2240 FORZ=5TO100STEP5:FORZZ=
    10TO100STEP10:POKES+1,Z:POKE
    S,ZZ:NEXTZZ,Z:RETURN
C9  2250 FORZ=20TO200STEP10:FORZ
    Z=1TO20:POKES+1,Z-ZZ:POKES+1
    ,ZZ+50:NEXTZZ,Z:RETURN
2B  2260 FORZ=1TO40:FORZZ=1TORND
    (1)*50:POKES+1,ZZ:NEXTZZ,Z:R
    ETURN
8B  2270 FORZ=10TO100STEP10:FORZ
    Z=5TO2:POKES+1,Z-ZZ:NEXTZZ,Z
    :RETURN
D2  2280 POKES+1,RND(1)*200+5:FO
    RZ=1TORND(1)*500+100:NEXTZ:R
    ETURN
D4  2290 POKES+1,RND(1)*200+5:FO
    RZ=1TORND(1)*100STEP.2:POKES
    +24,Z:NEXTZ:RETURN
17  2300 POKE53280,0:POKE53281,0
    :PRINTCHR$(5):PRINT"[CLR]"
1B  2310 FORI=1TO9:PRINT:NEXTI
70  2320 PRINT"[SPC12]CONGRATULA
    TIONS!!":PRINT
D0  2330 PRINT"[SPC17]YOU GOT[SP
    C6]":PRINT
75  2340 PRINT"[SPC10]ONE HUNDRE
    D PERCENT!!"
68  2350 Q=7:GOSUB2110
30  2360 GOSUB2110
72  2370 FORI=1TO400:NEXT
DB  2380 RETURN
92  2390 PRINT"[CLR]":POKE53280,
    0:POKE53281,0:PRINTCHR$(5)
CF  2400 PRINT"[SPC11]DISK UTILI
    TIES"
68  2410 PRINT:PRINT"[SPC11]1. V
    IEW DIRECTORY"
A5  2420 PRINT:PRINT"[SPC11]2. S
    CRATCH FILE"
EB  2430 PRINT:PRINT"[SPC11]3. V
    ALIDATE DISK"
E3  2440 PRINT:PRINT"[SPC11]4. F
    ORMAT DISK"
D3  2450 PRINT:PRINT"[SPC11]5. R
    EAD ERROR CHANNEL"
C9  2460 PRINT:PRINT"[SPC11]6. Q
    UIT TO MAIN MENU"
60  2470 PRINT:INPUT"[WHITE,DOWN
    ,SPC11]ENTER CHOICE[RIGHT2,C
    B,LEFT3]";A
EA  2480 ONAGOSUB2500,2630,2730,
    2900,3110,910
B8  2490 GOTO2390
D3  2500 PRINT"[CLR]":PRINT:PRIN
    T"[SPC10]PLACE DISK INTO DRI
    VE"
38  2510 PRINT:PRINT"[SPC7]<<PRE
    SS A KEY TO CONTINUE>>"
C5  2520 GETA$:IFA$=""THEN2520
43  2530 PRINT"[CLR]":OPEN1,8,0,
    "$"
75  2540 GET#1,B$:IFST<>0THEN259
    0
3F  2550 IFB$<>CHR$(34)THEN2540
44  2560 PRINTTAB(14):GET#1,B$:I
    FB$<>CHR$(34)THENPRINTB$;:GO
    TO2560
4C  2570 PRINTLEFT$(C$,3)
88  2580 IFST=0THEN2540
B9  2590 CLOSE1
DB  2600 PRINT:PRINT"[SPC7]<<PRE
    SS A KEY TO CONTINUE>>"
36  2610 GETA$:IFA$=""THEN2610
C8  2620 RETURN
CB  2630 PRINT"[CLR,SPC14]FILE D
    ELETE"
05  2640 PRINT:INPUT"[WHITE,DOWN
    ,SPC14]SURE Y/N[RIGHT2,CB,LE
    FT3]";A$
4E  2650 IFA$<>"Y"THEN2390
91  2660 A$="XX"
E8  2670 PRINT:PRINT"[SPC14]NAME
     TO":INPUT"[WHITE,DOWN,SPC14
    ]DELETE[RIGHT2,CB,LEFT3]";A$

8F  2680 IFA$="XX"THEN2390
30  2690 IFA$<>"XX"THENPRINT"[SP
    C14]DELETING ";A$
6E  2700 IFA$<>"XX"THENOPEN15,8,
    15
72  2710 PRINT#15,"S:";A$;""
C6  2720 CLOSE15:RETURN
```

```
C9  2730 PRINT"[CLR]":PRINT"[SPC
    16]VAL. DISK"
08  2740 PRINT:PRINT"[SPC10]PLAC
    E DISK INTO DRIVE"
BD  2750 PRINT:PRINT"[SPC7]<<PRE
    SS A KEY TO CONTINUE>>"
A0  2760 GETA$:IFA$=""THEN2760
E5  2770 OPEN15,8,15
54  2780 PRINT"[CLR]"
B4  2790 FORI=1TO12:PRINT:NEXTI
9D  2800 PRINT"[SPC13]VALIDATING
     DISK"
7E  2810 PRINT#15,"V"
D5  2820 CLOSE15
53  2830 PRINT"[CLR]"
43  2840 FORI=1TO12:PRINT:NEXTI
56  2850 POKE198,0
79  2860 PRINT"[CLR]":PRINT"[SPC
    12]DISK VALIDATED"
40  2870 PRINT:PRINT"[SPC6]<<PRE
    SS A KEY TO CONTINUE>>"
CE  2880 GETA$:IF A$=""THEN2880
DB  2890 RETURN
9D  2900 PRINT"[CLR]"
8E  2910 POKE53280,0:POKE53281,0

E7  2920 PRINTCHR$(5)
18  2930 PRINT"[SPC14]FORMAT DIS
    K"
FB  2940 PRINT:INPUT"[SPC14]SURE
    ? Y/N";A$
67  2950 IFA$="Y"THEN2970
2F  2960 IFA$<>"Y"THEN2390
7E  2970 PRINT:INPUT"[SPC14]DISK
     NAME";N$
D6  2980 PRINT:INPUT"[SPC14]ID";
    I$
08  2990 OPEN15,8,15
DC  3000 PRINT#15,"N:"N$","I$""
07  3010 PRINT"[CLR]"
CF  3020 FORI=1TO12:PRINT:NEXTI
29  3030 PRINT"[SPC8]FORMATTING
    DISK " N$ " " I$""
49  3040 CLOSE15
3F  3050 PRINT"[CLR]"
D3  3060 PRINT"[SPC12]DISK " N$
    " " I$" READY"
85  3070 PRINT:PRINT"[SPC12]ANOT
    HER DISK Y/N"
E4  3080 GETA$:IFA$=""THEN3080
AD  3090 IFA$="Y"THENGOTO2970
E2  3100 IFA$<>"Y"THEN2390
64  3110 PRINT"[CLR]":FORI=0TO4:
    PRINT:NEXTI
84  3120 PRINTTAB(14)
91  3130 OPEN2,8,15
5F  3140 GET#2,A$:PRINTA$;:IF A$
    <>CHR$(13)GOTO3140
2C  3150 CLOSE2
59  3160 PRINT:PRINT"[SPC7]<<PRE
    SS A KEY TO CONTINUE>>"
00  3170 GETA$:IF A$=""THEN3170
F6  3180 RETURN
8F  3190 DATA120,169,21,141,20,3
    ,169,192,141,21
23  3200 DATA3,173,14,220,9,128,
    141,14,220,88
7B  3210 DATA96,230,171,165,171,
    201,60,144,79,169
26  3220 DATA26,133,167,169,4,13
    3,168,24,169,0
87  3230 DATA101,167,133,169,169
    ,212,101,168,133,170
D4  3240 DATA173,11,220,72,160,1
    29,41,128,240,2
75  3250 DATA160,144,152,160,0,1
    45,167,32,129,192
AE  3260 DATA32,134,192,104,41,1
    27,32,111,192,169
CA  3270 DATA58,145,167,32,129,1
    92,173,10,220,32
33  3280 DATA111,192,169,58,145,
    167,32,129,192,173
C1  3290 DATA9,220,32,111,192,17
    3,8,220,76,49
0C  3300 DATA234,72,41,240,74,74
    ,74,74,32,124
44  3310 DATA192,104,41,15,24,10
    5,176,145,167,173
7B  3320 DATA53,3,145,169,230,16
    7,208,2,230,168
AD  3330 DATA230,169,208,2,230,1
    70,96
6B  3340 DATA173,52,3,141,39,208
    ,141,40,208,141,41,208,141,4
    2,208,141,43,208
A2  3350 DATA141,44,208,141,45,2
    08,96
CC  3360 DATA255,255,255,192,0,0
    ,192,0,0,192,0,0,192,0,0,192
    ,0,0,192,0,0,192
44  3370 DATA0,0,192,0,0,192,0,0
    ,192,0,0,192,0,0,192,0,0,192
    ,0,0
D2  3380 DATA192,0,0,192,0,0,192
    ,0,0,192,0,0,192,0,0,192,0,0
    ,255,255,255,255
0C  3390 DATA255,255,255,0,0,0,0
    ,0,0,0,30,192,0,126,224,0
6C  3400 DATA231,240,0,198,112,1
    ,198,120,1,222,56,1,206,119,
    1,207
70  3410 DATA119,0,219,227,0,241
    ,235,0,127,251,0,31,121,0,0,
    16
E2  3420 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,255,255,255,0
D0  3430 DATA255,255,255,0,0,0,0
    ,0,0,0,0,0,0,0,0,0
41  3440 DATA0,0,0,0,96,0,0,48,0
    ,0,48,113,198,49,55,239
E6  3450 DATA188,55,109,60,55,19
    8,48,243,169,48,153,239,56,0
    ,2,8
7A  3460 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,255,255,255,0
08  3470 DATA255,255,255,0,0,0,0
    ,0,0,0,0,0,0,0,0,0
B8  3480 DATA0,0,0,0,0,0,0,0,0,0
    ,0,128,0,0,7,44
55  3490 DATA28,207,191,50,204,1
    79,54,205,179,54,207,153,155
    ,2,0,0
12  3500 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,255,255,255,0
40  3510 DATA255,255,255,0,0,0,0
    ,0,0,0,0,0,0,0,0,0
D5  3520 DATA0,1,0,0,3,0,0,0,0,0
    ,0,192,0,0,13,142
C1  3530 DATA0,102,223,0,102,27,
    0,102,30,0,99,29,128,1,7,3
6A  3540 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,255,255,255,0
96  3550 DATA255,255,255,0,0,0,0
    ,0,0,112,0,0,240,0,0,240
4C  3560 DATA0,0,112,0,0,112,0,0
    ,112,0,0,112,0,0,112,0
05  3570 DATA0,112,0,0,112,0,0,1
    12,0,0,248,0,0,252,0,0
82  3580 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,255,255,255,0
0B  3590 DATA255,255,0,0,3,0,0,3
    ,0,0,3,0,0,3,0,0
8B  3600 DATA3,0,0,3,0,0,3,0,0,3
    ,0,0,3,0,0,3
DE  3610 DATA0,0,3,0,0,3,0,0,3,0
    ,0,3,0,0,3,0
C5  3620 DATA0,3,0,0,3,0,0,3,0,0
    ,3,0,255,255,0,0
```

PROGRAM: LISTING 1

```
  10                    .ORG    $C
000
  20 CIAIRQMASK         =$DC0D
  30 CIAIRQREG          =$DD0D
  40 VICCTRL            =$D011
  50 RASCOMPARE         =$D012
  60 RASTER1            =$0A
  70 RASTER2            =$9E
  80 YELLOW             =$07
  90 BLACK              =$00
 100 BORDER             =$D020
 110 SCREEN             =$D021
 120 LO.VECTOR          =$0314
 130 HI.VECTOR          =$0315
 140 VICIRQ             =$D019
 150 IRQMASK            =$D01A
 160 INITIALISE         SEI
 170                    ;DISABLE I
RQ
 180                    LDA #$1F
 190                    STA CIAIRQ
MASK
 200                    STA CIAIRQ
REG
 210                    ;ENABLE IR
Q
 220                    LDA CIAIRQ
MASK
 230                    LDA CIAIRQ
REG
 240                    LDA VICCTR
L
 250                    AND #$7F
 260                    STA VICCTR
L
 270                    ;CHANGE $0
314 VECTOR TO ROUTINE 1
 280 SETPOINT           LDA #ROUTI
NE1&255
 290                    STA LO.VEC
TOR
 300                    LDA #ROUTI
NE1/256
 310                    STA HI.VEC
TOR
 320                    ;ENABLE IR
Q
 330                    LDA #$01
 340                    STA IRQMAS
K
 350                    ;SET RASTE
R INTERRUPT CONTROL TO FIRST SPL
IT
 360 RASTERUPT          LDA #RASTE
R1
 370                    STA RASCOM
PARE
 380                    ;RETURN TO
 BASIC
 390                    CLI
 400                    RTS
 410                    ;
 420                    ;
 430                    ;SET COLOU
R TO YELLOW
 440 ROUTINE1           LDA #YELLO
W
 450                    STA BORDER
 460                    STA SCREEN
 470                    ;SET INTER
RUPT VECTORS FOR SECOND SPLIT
 480                    LDA #ROUTI
NE2&255
 490                    STA LO.VEC
TOR
 500                    LDA #ROUTI
```

```
NE2/256
  510                   STA HI.VEC
TOR
  520                   LDA #RASTE
R2
  530                   STA RASCOM
PARE
  540                   LDA #$01
  550                   STA VICIRQ
  560                   JMP $EA31
  570                   ;
  580                   ;
  590                   ;NOP PAD M
AY NEED INCREASE/DECREASE FOR YO
UR MACHINE
  600 ROUTINE2          NOP
  610                   NOP
  620                   NOP
  630                   NOP
  640                   NOP
  650                   NOP
  660                   NOP
  670                   NOP
  680                   NOP
  690                   ;CHANGE CO
LOUR TO BLACK
  700                   LDA #BLACK
  710                   STA BORDER
  720                   STA SCREEN
  730                   ;SET UP VE
CTORS FOR ROUTINE 1
  740                   LDA #ROUTI
NE1&255
  750                   STA LO.VEC
TOR
  760                   LDA #ROUTI
NE1/256
  770                   STA HI.VEC
TOR
  780                   LDA #RASTE
R1
  790                   STA RASCOM
PARE
  800                   ;SET VIC I
RQ FLAG
  810                   LDA #$01
  820                   STA VICIRQ
  830                   JMP $EA31
```

PROGRAM: LISTING 2

```
  570                   ;
  580                   ;
  590                   ;REWORKED
ROUTINE
  600 ROUTINE2          LDA #ROUTI
NE1&255
  610                   STA LO.VEC
TOR
  620                   LDA #ROUTI
NE1/256
  630                   STA HI.VEC
TOR
  640                   LDA #RASTE
R1
  650                   STA RASCOM
PARE
  660                   ;CHANGE CO
LOUR TO BLACK
  670                   LDA #BLACK
  680                   STA BORDER
  690                   STA SCREEN
  700                   ;SET VIC I
RQ FLAG
  710                   LDA #$01
  720                   STA VICIRQ
  730                   JMP $EA31
  740                   ;DELETE OL
D LINES 750-830
```

PROGRAM: LISTING 3

```
  10                    .ORG    $C
000
  20 CIAIRQMASK         =$DC0D
  30 CIAIRQREG          =$DD0D
  40 VICCTRL            =$D011
  50 RASCOMPARE         =$D012
  60 RASTER1            =$0A
  70 RASTER2            =$9E
  80 YELLOW             =$07
  90 BLACK              =$00
 100 BORDER             =$D020
 110 SCREEN             =$D021
 120 LO.VECTOR          =$0314
 130 HI.VECTOR          =$0315
 140 VICIRQ             =$D019
 150 IRQMASK            =$D01A
 160 INITIALISE         SEI
 170                    JSR CHARMO
VE
 180                    ;DISABLE I
RQ
 190                    LDA #$1F
 200                    STA CIAIRQ
MASK
 210                    STA CIAIRQ
REG
 220                    ;ENABLE IR
Q
 230                    LDA CIAIRQ
MASK
 240                    LDA CIAIRQ
REG
 250                    LDA VICCTR
L
 260                    AND #$7F
 270                    STA VICCTR
L
 280                    ;CHANGE $0
314 VECTOR TO ROUTINE 1
 290 SETPOINT           LDA #ROUTI
NE1&255
 300                    STA LO.VEC
TOR
 310                    LDA #ROUTI
NE1/256
 320                    STA HI.VEC
TOR
 330                    ;ENABLE IR
Q
 340                    LDA #$01
 350                    STA IRQMAS
K
 360                    ;SET RASTE
R INTERRUPT CONTROL TO FIRST SPL
IT
 370 RASTERUPT          LDA #RASTE
R1
 380                    STA RASCOM
PARE
 390                    ;RETURN TO
 BASIC
 400                    CLI
 410                    RTS
 420                    ;
 430                    ;
 440                    ;SET COLOU
R TO YELLOW
 450 ROUTINE1           LDA #YELLO
W
 460                    STA BORDER
 470                    STA SCREEN
 480                    LDA $D018
 490                    AND #$F0
 500                    ORA #$04
 510                    STA $D018
 520                    ;SET INTER
RUPT VECTORS FOR SECOND SPLIT
 530                    LDA #ROUTI
NE2&255
 540                    STA LO.VEC
TOR
 550                    LDA #ROUTI
NE2/256
 560                    STA HI.VEC
TOR
 570                    LDA #RASTE
R2
 580                    STA RASCOM
PARE
 590                    LDA #$01
 600                    STA VICIRQ
 610                    JMP $EA31
 620                    ;
 630                    ;
 640                    ;REWORKED
ROUTINE
 650 ROUTINE2           LDA #ROUTI
NE1&255
 660                    STA LO.VEC
TOR
 670                    LDA #ROUTI
NE1/256
 680                    STA HI.VEC
TOR
 690                    LDA #RASTE
R1
 700                    STA RASCOM
PARE
 710                    ;CHANGE CO
LOUR TO BLACK
 720                    LDA #BLACK
 730                    STA BORDER
 740                    STA SCREEN
 750                    LDA $D018
 760                    AND #$F0
 770                    ORA #$06
 780                    STA $D018
 790                    ;SET VIC I
RQ FLAG
 800                    LDA #$01
 810                    STA VICIRQ
 820                    JMP $EA31
 830                    ;
 840                    ;
 850                    ;SWITCH IN
 CHARACTER ROM
 860 CHARMOVE           LDA $01
 870                    AND #$FB
 880                    STA $01
 890                    ;MOVE CHAR
ACTER DATA TO $1000
 900                    LDY #$00
 910 LOOP               LDA $D000,
Y
 920                    STA $1000,
Y
 930                    LDA $D100,
Y
 940                    STA $1100,
Y
 950                    LDA $D200,
Y
 960                    STA $1200,
Y
 970                    LDA $D300,
Y
 980                    STA $1300,
Y
 990                    LDA $D800,
Y
 1000                   STA $1800,
Y
 1010                   LDA $D900,
Y
```

```
 1020                    STA $1900,
Y
 1030                    LDA $DA00,
Y
 1040                    STA $1A00,
Y
 1050                    LDA $DB00,
Y
 1060                    STA $1B00,
Y
 1070                    INY
 1080                    BNE LOOP
 1090                    ;SWITCH OU
T CHARACTER ROM
 1100                    LDA $01
 1110                    ORA #$04
 1120                    STA $01
 1130                    RTS
```

PROGRAM: LISTING 4

PROGRAM: BASIC LOADER

```
F5   0 DATA 120, 32, 130, 192, 16
     9, 31, 141, 13
4D   1 DATA 220, 141, 13, 221, 17
     3, 13, 220, 173
A0   2 DATA 13, 221, 173, 17, 208
     , 41, 127, 141
65   3 DATA 17, 208, 169, 48, 141
     , 20, 3, 169
52   4 DATA 192, 141, 21, 3, 169,
      1, 141, 26
97   5 DATA 208, 169, 10, 141, 18
     , 208, 88, 96
D5   6 DATA 169, 7, 141, 32, 208,
      141, 33, 208
C1   7 DATA 173, 24, 208, 41, 240
     , 9, 4, 141
2B   8 DATA 24, 208, 169, 89, 141
     , 20, 3, 169
A5   9 DATA 192, 141, 21, 3, 169,
      158, 141, 18
0B  10 DATA 208, 169, 1, 141, 25
     , 208, 76, 49
3E  11 DATA 234, 169, 48, 141, 2
     0, 3, 169, 192
43  12 DATA 141, 21, 3, 169, 10,
      141, 18, 208
6F  13 DATA 169, 0, 141, 32, 208
     , 141, 33, 208
24  14 DATA 173, 24, 208, 41, 24
     0, 9, 6, 141
45  15 DATA 24, 208, 169, 1, 141
     , 25, 208, 76
1B  16 DATA 49, 234, 165, 1, 41,
      251, 133, 1
93  17 DATA 160, 0, 185, 0, 208,
      153, 0, 16
BB  18 DATA 185, 0, 209, 153, 0,
      17, 185, 0
D6  19 DATA 210, 153, 0, 18, 185
     , 0, 211, 153
3D  20 DATA 0, 19, 185, 0, 216,
     153, 0, 24
B4  21 DATA 185, 0, 217, 153, 0,
      25, 185, 0
1C  22 DATA 218, 153, 0, 26, 185
     , 0, 219, 153
0E  23 DATA 0, 27, 200, 208, 205
     , 165, 1, 9
D4  24 DATA 4, 133, 1, 96,-1
45  100 READA:IFA=-1THENEND
A7  110 POKE49152+B,A
69  120 B=B+1
3C  130 GOTO100
```

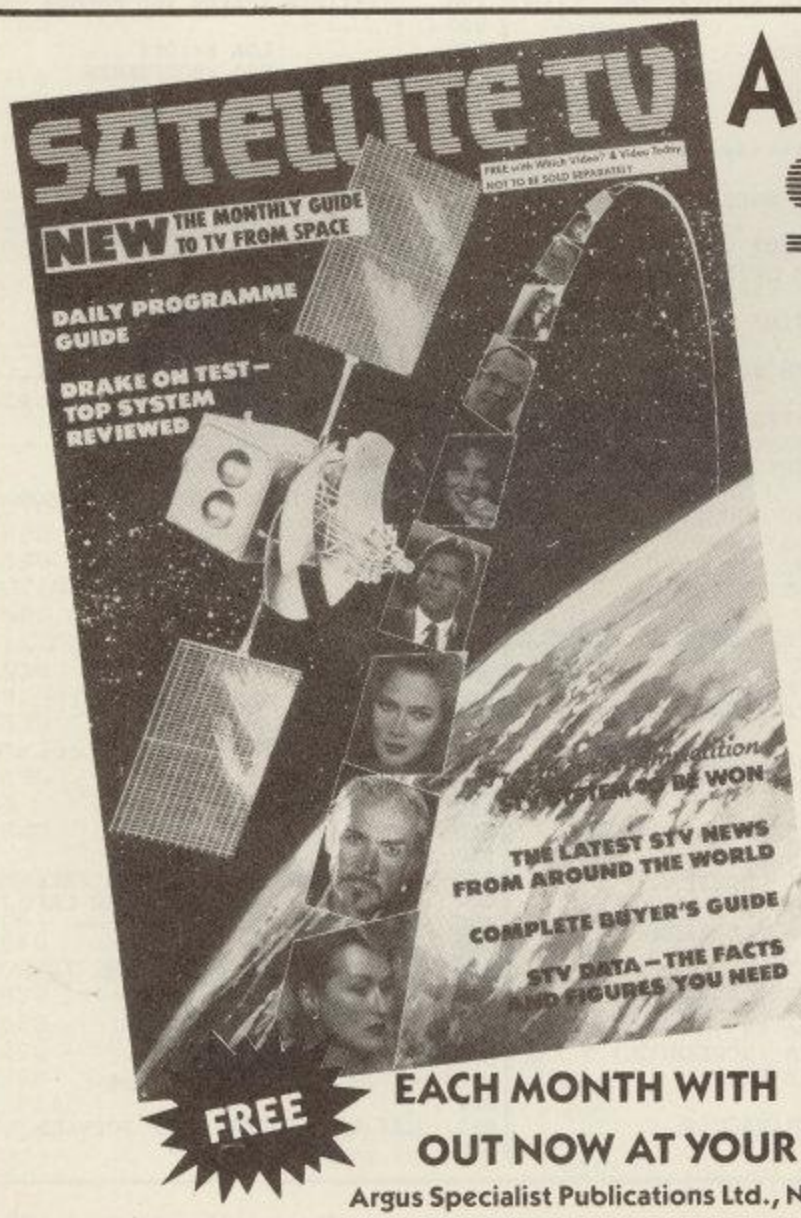
```
PRG-NAME: BYT'TYPEWRITER
FILENAME: CURSOR RT'S
```

```
10              ORG 50000
20   ;
30   IRQVECTOR  EQU $0314
40   NORMALIRQ  EQU $EA31
50   COUNT      EQU 170
60   CURSFLAG   EQU 171
70   ;
80   ;
90              JMP CURSORON
100             JMP CURSOROFF
110  ;
120  ;
130  ;     ***   TURN CURSOR ON   ***
140  ;
150  CURSORON   SEI
160             LDA #<FLASHCURS
170             STA <IRQVECTOR
180             LDA #>FLASHCURS
190             STA >IRQVECTOR
200  ;
210             LDA #0
220             STA CURSFLAG
230             STA COUNT
240  ;
250             CLI
260             RTS
270  ;
280  ;
290  ;
300  ;
310  ;     ***   TURN CURSOR OFF   ***
320  ;
330  CURSOROFF  SEI
340             LDA #<NORMALIRQ
350             STA <IRQVECTOR
360             LDA #>NORMALIRQ
370             STA >IRQVECTOR
380             CLI
390             RTS
400  ;
410  ;
420  ;
430  ;*******************************
440  ;
450  ; ***  FLASH CURSOR ROUTINE  **
460  ;
470  ; (THIS ROUTINE IS CALLED EVERY
480  ;       60TH OF A SECOND.)
490  ;
500  ;BUMP REAL TIME CLOCK.
510  ;
520  FLASHCURS JSR $FFEA
530  ;
540  ;UPDATE COUNTER. IF 20 HAS BEEN
550  ;REACHED, CHANGE CURSOR. ELSE
560  ;EXIT STRAIGHT AWAY.
570  ;
580             INC COUNT
590             LDA COUNT
600             CMP #20
610             BNE EXIT
620  ;
630  ;RESET COUNTER AND TEST CURSFLAG
640  ;
650  CHANGE     LDA #0
660             STA COUNT
670  ;
680             LDA CURSFLAG
690             BNE PRINTCHAR
700  ;
710  ;PRINT INVERTED CHARACTER...
720  ;
730             INC CURSFLAG
740             LDY #0
750             LDA (SCREENMEM),Y
760             CLC
770             ADC #128
780             STA (SCREENMEM),Y
790             LDA #6
800             STA (SCREENCOL),Y
810             BNE EXIT
820  ;
830  ;OR NORMAL CHARACTER.
840  ;
850  PRINTCHAR  DEC CURSFLAG
860             LDY #0
870             LDA (SCREENMEM),Y
880             SEC
890             SBC #128
900             STA (SCREENMEM),Y
910             LDA #6
920             STA (SCREENCOL),Y
930  ;
940  ;
950  ;
960  ;DO REST OF NORMAL INTERUPT-RT.
970  ;
980  EXIT       JMP $EA7B
```

```
PRG-NAME: BYT'TYPEWRITER
FILENAME: TYPEWRITER RT
```

```
10              ORG 49152
20   ;
30   SCREENMEM  EQU 251
40   SCREENCOL  EQU 253
50   TEXTFILE   EQU 168
60   ;
70   GETIN      EQU $FFE4
80   CURSORON   EQU 50000
90   CURSOROFF  EQU 50003
100  ;
110  ;
120  ;INITIATE TEXTFILE.
130  ;
140             LDA #<10000
150             STA <TEXTFILE
160             LDA #>10000
170             STA >TEXTFILE
180  ;
190  ;INITIATE SCREEN AND COLOUR VARS.
200  ;
210             LDA #<1024
220             STA <SCREENMEM
230             LDA #>1024
240             STA >SCREENMEM
250  ;
260             LDA #<55296
270             STA <SCREENCOL
280             LDA #>55296
290             STA >SCREENCOL
300  ;
310  ;CLEAR THE SCREEN.
320  ;
330             JSR $E544
340  ;
350  ;SWITCH COMPUTER INTO
360  ;BUSINESS MODE.
370  ;
380             LDA #14
390             JSR $E716
400  ;
410  ;TURN INTERRUPT-DRIVEN CURSOR ON.
420  ;
430             JSR CURSORON
440  ;
450  ;
460  ;
470  ;WAIT FOR KEYPRESS.
480  ;
490  GETKEY     JSR GETIN
500             BEQ GETKEY
510  ;
520  ;IF F1 PRESSED, EXIT.
530  ;
540             CMP #133
550             BNE GETKEY1
560             JMP EXIT
570  ;
580  ;IF DELETE KEY HAS BEEN PRESSED,
590  ;JUMP TO DELETION & CRSR LEFT RT
600  ;
610  GETKEY1    CMP #20
620             BEQ DELE.CRSR
630  ;
640  ;IF CRSR LEFT, DITO.
650  ;
660             CMP #157
670             BEQ DELE.CRSR
680  ;
690  ;IF CRSR RIGHT, JUMP FORWARD.
700  ;
```

```
710             CMP #29
720             BEQ CURSRIGHT
730   ;
740   ;
750   ;
760   ;STORE CHARACTER IN TEXTFILE.
770   ;
780             LDY #0
790             STA (TEXTFILE),Y
800   ;
810   ;CONVERT ASCII INTO SCREEN CODE.
820   ;
830             CMP #128
840             BCC SKIP
850             SBC #64       ;UPPER CASE
860   SKIP      CMP #64       ;LOWER CASE
870             BCC PRINT
880             SBC #64
890   ;
900   ;PRINT CHARACTER ONTO SCREEN.
910   ;
920   PRINT     STA (SCREENMEM),Y
930             LDA #6
940             STA (SCREENCOL),Y
950   ;
960   ;ADVANCE TO NEXT PRINT POSITION.
970   ;
980   CURSRIGH1 INC <TEXTFILE
990             BNE NOHIGH
1000            INC >TEXTFILE
1010  ;
1020  NOHIGH    INC <SCREENMEM
1030            BNE NOHIGH1
1040            INC >SCREENMEM
1050  ;
1060  NOHIGH1   INC <SCREENCOL
1070            BNE GETKEY
1080            INC >SCREENCOL
1090            BNE GETKEY
1100  ;
1110  ;
1120  ;
1130  ;CRSR RIGHT ROUTINE:
1140  ;RECOVER CHARACTER TO THE LEFT
1150  ;AND JUMP BACK TO MAIN ROUTINE.
1160  ;
1170  CURSRIGHT LDY #0
1180            LDA (SCREENMEM),Y
1190            CMP #128
1200            BCC PRINT2
1210            SBC #128
1220  PRINT2    STA (SCREENMEM),Y
1230            LDA #6
1240            STA (SCREENCOL),Y
1250  ;
1260            BNE CURSRIGH1
1270  ;
1280  ;
1290  ;
1300  ;DELETION & CRSR LEFT ROUTINE:
1310  ;
1320  ;IF BEG. OF SCREEN, EXIT.
1330  ;
1340  DELE.CRSR LDX #<1024
1350            CPX <SCREENMEM
1360            BNE START
1370            LDX #>1024
1380            CPX >SCREENMEM
1390            BEQ GETKEY
1400  ;
1410  ;SAVE ACCUMULATOR.
1420  ;
1430  START     PHA
1440  ;
1450  ;RECOVER CHARACTER TO THE LEFT.
1460  ;
1470            LDY #0
1480            LDA (SCREENMEM),Y
1490            CMP #128
1500            BCC PRINT1
1510            SBC #128
1520  PRINT1    STA (SCREENMEM),Y
1530            LDA #6
1540            STA (SCREENCOL),Y
1550  ;
1560  ;GO ONE POSITION BACKWARDS.
1570  ;
1580            LDA <TEXTFILE
1590            BNE NOHIGH2
1600            DEC >TEXTFILE
1610  NOHIGH2   DEC <TEXTFILE
1620  ;
1630            LDA <SCREENMEM
1640            BNE NOHIGH3
1650            DEC >SCREENMEM
1660  NOHIGH3   DEC <SCREENMEM
1670  ;
1680            LDA <SCREENCOL
1690            BNE NOHIGH4
1700            DEC >SCREENCOL
1710  NOHIGH4   DEC <SCREENCQL
1720  ;
1730  ;RECOVER ACCUMULATOR AND TEST IT.
1740  ;IF CRSR LEFT, EXIT.
1750  ;
1760            PLA
1770            CMP #157
1780            BEQ CRSREXIT
1790  ;
1800  ;PRINT A SPACE OVER LETTER.
1810  ;
1820            LDY #0
1830            LDA #32             ;SPACE
1840            STA (TEXTFILE),Y
1850            STA (SCREENMEM),Y
1860            LDA #6              ;BLUE
1870            STA (SCREENCOL),Y
1880  ;
1890  CRSREXIT  JMP GETKEY
1900  ;
1910  ;
1920  ;
1930  ;
1940  ;MAIN EXIT:
1950  ;TURN INTERRUPT DRIVEN CURSOR OFF
1960  ;AND RETURN TO BASIC.
1970  ;
1980  EXIT      JSR CURSOROFF
1990            RTS
```

Are you receiving it?

SATELLITE TV

Easy to understand
◆
Full programme details
◆
In-depth reviews
◆
Interesting features
◆
Questions answered
◆
and more...

Each month this magazine contains all you need to know about Satellite TV – the latest news, hardware and programme reviews, answers to often-asked readers' questions, interesting features and a comprehensive programme listing for the next month's viewing.

YOU CAN'T AFFORD TO MISS IT!

EACH MONTH WITH video TODAY and Which Video?

OUT NOW AT YOUR LOCAL NEWSAGENT

Argus Specialist Publications Ltd., No 1 Golden Square, London W1R 3AB

Repairs Guide

CALL

JON WATSON

ON

01 — 437 0699

PROBLEMS WITH YOUR COMMODORE ?

FOR FAST, RELIABLE AND PROFESSIONAL REPAIRS AT COMPETITIVE PRICES

P M ENGINEERING

VISA

UNIT 8, NEW ROAD, ST. IVES, CAMBRIDGESHIRE. PE17 - 4BG

ST. IVES (0480) 61394

FAST COMPUTER REPAIR CENTRE — LONDON

★ Commodore, BBC Micro Spectrum, Amstrad, Atari, IBM + Others

★ We sell a wide range of spares

PHONE 01-863 7166

PROMPT ELECTRONICS
Unit 4, 15 Springfield Road, Harrow, Middx, HA5 1QF

Entrance in Amersham Road

COMMODORE SPARES AND REPAIRS

906114-01	£8.95
6510	£9.95
6526 CIA	£9.50
6581 SID	£11.75
901227-03	£8.25
901226-01	£10.75
901225-01	£7.95
8501	£7.75

INCL. VAT & P&P

OASIS

14 RIDGEWAY ROAD, SALISBURY, WILTSHIRE, SP1 3BU
TELEPHONE (0722) 335061

ADVERTISE YOUR SERVICE IN THIS SPECIALIST REPAIR GUIDE.

DEADLINE FOR NEXT ISSUE 11TH FEBRUARY

COMPUTER REPAIRS

SPECTRUM, COMMODORE, AMSTRAD, ACORN, BBC etc.

Fixed charge repairs on all makes

Please ring for details:

MCE SERVICES

33 Albert Street, Mansfield, Notts NG18 1EA
Tel: 0623 653512

SCOTTISH COMPUTER REPAIR CENTRE

FIRST CLASS REPAIRS AT FIXED PRICES

C64...**£26** SPECTRUM...**£16** AMSTRAD CPC...**POA**
C16...**£20** VIC 20/C+4...**£22** ELECTRON BBC etc...**POA**
PRINTERS, MODEMS, TV'S, VDU'S...**POA**

Pick up & delivery service throughout Central Scotland
3 Month Guarantee on all repairs.

Enclose payment with order to: **S C R C**
Unit 26A
Hawkslaw Trad. Est.
Leven, Fife. KY8 4LT
Tel: 0333 21487

TRADE & COMMERCIAL ENQUIRIES WELCOME

COMMODORE REPAIRS

(with FREE extended guarantee)

COMMODORE 64	**26.70**
COMMODORE C16/+4	**19.70**
VIC 20	**18.70**
D/DRIVES, PRINTERS etc	**POA**

Price is all inclusive and we guarantee the whole computer for six months.

KPR MICRO, DEPT. YC

34, Petunia Crescent, Springfield, Chelmsford, Essex CM1 5YP
Tel. 0245 - 468554

COMPUTER REPAIRS

Fast and Professional Repair Service in the South East!

Repairs to most makes of micros and peripherals.
Amstrad approved service centre
Three month warranty on all work

MICRO COMPUTER REPAIR SERVICES

47 Mungo Park Way, Orpington, Kent
Tel. Orpington (0689) 73353 any time

MFB COMPUTERS

Fast Computer Repair Service For All Leading Makes of Personal Computers.

Commodore 64	**from £25 inc.**
Commodore C16	**£18.95 inc.**
Vic 20 C+4	**from £19.95 inc.**
Commodore PSU's	**£22.50 inc.**
BBC's	**from £29.95 inc.**
Electrons	**from £19.95 inc.**
Amstrad CPC 464	**£32 inc.**
Altai Commodore compatible cassette deck	**£29.95 inc.**

14 VICTORIA ROAD, ELLAND, W. YORKS TEL. 0422 76698

SPECIALIST COMMODORE REPAIRS

Commodore 64	£20.00
1541 Logic Fault	£20.00
1541 Alignment	£18.00
CBM Modem	£14.00
Commodore C16	£18.00
Commodore +4	£18.00
Commodore 128	£30.00

All repairs carried out using the latest diagnostics and test equipment. This ensures a faster repair to your computer or peripheral.
When the fault has been rectified we final test with checksum diagnostics to ensure any new components fitted function correctly.
There is no extra charge for posting. All prices fully inclusive. (No Hidden Extras).
Other Commodore Home Computers and Peripherals repaired on request. Don't hesitate to phone:

I. Bateman Specialist Computer Repairs
Telephone: Corby (0536) 69454 24 hour answering service

FIXED PRICE COMPUTER REPAIRS

All types of Home Computers: **Amstrad, Sinclair, Commodore, BBC etc. Prices from £7.00** (for minor faults eg. keyboard type faults. Inclusive VAT and P&P 3 months guarantee.
Also, we buy, sell, rent new or used home/micro computers. Also available: Spares, Software, Cables, Peripherals and maintenance contracts etc.
PHONE (0702) 618455/613741 for immediate prices.
Packaging materials supplied.

SPECIAL OFFER: SPECTRUM & UPGRADE £31 inc VAT/P&P

ANALYTICAL ENGINEERING LTD.,
Analytic House, Granger Road Ind. Est., Southend on sea, Essex SS2 5DD

Repairs Guide

PHONE JON WATSON ON 01-437 0699 EXT. 281

COMPUTER REPAIRS

Fixed Super Low Prices!

Inclusive of parts, labour and VAT

FIRST AID FOR TECHNOLOGY

1 week turnaround Collection/delivery available for local area

★ SUPER OFFERS ★

SPECTRUM	£14 inc. + Free Game	ELECTRON	£19 inc.
C64	£22 inc. + Free Game	AMSTRAD 464	£32 inc. + Free Game
C16	£18 inc.		
VIC20, C+4	£22 inc.	SPECTRUM 128	£16 inc.
BBC	£32 inc.	C64 P.S.U. for sale	£20 inc.

Please enclose payment with item - 3 month warranty on repair. Please enclose advert with repair

W.T.S. ELECTRONICS

5-9 Portland Road, Luton, Beds LU4 8AT. Tel: 0582 458375. Telex: 265871

CROYDON COMPUTER CENTRE

29 Brigstock Road, Thornton Heath, Surrey, CR4 7JJ Tel: 01 683 2646

COMPUTER SERVICING

(Est'd since 1979)

We repair — on the premises — quick turnround

- ★ Commodore & Spectrum
- ★ BBC & Electron (Approved Service Centre)
- ★ Amstrad & Torch (Approved Service Centre)
- ★ Disc Drives, Printers, Monitors

Mail Orders by phone Access & Visa accepted

SPARES AND REPAIRS **HEATH COMPUTERS** *WE FIX MOST MAKES OF COMPUTERS*

SPARES		REPAIRS	
CBM64 PSU	£22.00	CBM 64	FROM £25.00
6569	£17.50	CBM 16	FROM £25.00
6581	£10.00	CBM +4	FROM £25.00
8501	£10.00	CBM 128	FROM £30.00
6561	£10.00	BBC	FROM £30.00
6510	£10.00	ELECTRON	FROM £30.00
6526	£10.00	CASSETTE	FROM £10.00
KERNAL ROM	£10.00	1541	FROM £25.00
BASIC ROM	£10.00	CBM PRINTERS	FROM £25.00
PLA	£12.00		

HEATH COMPUTERS & ELECTRONICS LTD
PLEASE ADD VAT TO ALL PRICES
TEL: (021) 771 3636 (BIRMINGHAM)

YOUR COMMODORE

Lineage: 54p per word. (including VAT)

Semi display: £11.73 per single column centimetre (including VAT) minimum 2cm. Ring for information on series bookings/discounts.

All advertisements in this section must be prepaid.
Advertisements are accepted subject to the terms and conditions printed on the advertisement rate card (available on request).

01-437 0699

Send your requirements to:
JON WATSON
ASP LTD, 1 GOLDEN SQUARE, LONDON W1

HARDWARE

TAPE BACK-UP BOARDS

FOR CBM-64/128 & VIC 20

The **Mk.1. uses a second CBM type cassette deck to copy a program as it loads. Very easy to use.**
£8.95 inc. P&P
NEW IMPROVED Mk.2. has a built in speaker so you can hear your copy being made. Works like the Mk.1. or can be switched to use our 'GENERATOR' software method.
£14.00 inc. P&P
ROM/SWITCH RESET BOARD resets ALL programs that a standard switch can't. Also has a socket for an 8K Eprom. Full instructions supplied.
£8.00 inc. P&P

All products guaranteed for 12 months

Send your cheque/P.O. or stamp for details to:- **TURBOTRONIC,** 46, Rippon Street, Parkinson Lane, HALIFAX, West Yorkshire, HX1 3UG. Tel. (0422) 52020.

01-437 0699 = RESULTS

SPECIAL OFFERS

C64 & +4 POWER SUPPLIES
In stock £17.50 inc. P&P.
Cheque/P.O. to:-
W.E.
High House
Preston-On-Wye,
Hereford,
HR2 9JU

DISCOUNT SOFTWARE: Latest titles for CBM64/128 at 75% off R.R.P.: S.A.E. To: A.O.W. 104 Hollywell Road, Lincoln. LN5 9BY.

WANTED

DRILLER wanted, will travel. S Cape, Freedom Road, Freescape. DRI LLER.

SERVICES

128 USERS CLUB

★ International PenPal List ★ Quarterly Magazine
★ Public Domain Software ★ Software Data Base

For More Details Write to:-
Brampton, Croome Road, Defford, Worcs. WR8 9AR

COMMODORE 64. Need a printed listing of your Basic program? Send your Cassette or Disk with £1 to Withers, 3 Beedon Avenue, Little Lever, Bolton, BL3 1QH.

COMMODORE DISK LIBRARY

Free membership. Wide selection. send 2 x 18p stamps for deatils.
To: Commodore Disk Library 23 Curzon St., Derby.

BUSINESS OPPORTUNITIES

IDEAS, INVENTIONS Wanted. Call I.S.C. 01 434 1272 or write: Dept (ASP) 99 Regent St, London W1.

LOOK OUT FOR COMMODORE DISK USER.

WARNING NOTICE

Advertisements placed in this magazine are to be in strict compliance with our standard conditions (copies of which conditions are available on request) and on the clear understanding that the advertiser warrants that his advertisement(s) does not infringe any copyright or condition of sale of any interested party in the advertised product.

Further, the advertiser indemnifies the proprietors of this magazine in respect of costs, damages, or any other claims brought against them as a result of legal action arising from the publication of the advertisement.

Any breach of these terms or the said conditions may result in prosecution of the advertiser by the proprietors.

FOR SALE

NEOS?

YOU NEED THE MOUSE PLUS

Enables you to use the mouse and keyboards together. Can be left connected all the time - includes a disc containing the mouse menu, Amiga style pull down menus while you programme. Two mouse drivers for your own programmes and D cheese mod. Full manual supplied. Let your C64 use the whole power of the mouse. Does not damage the keyboard.

Send £19.95 to: or phone for more details
Shazaan Systems
8 Alm Close, Knap Hill, Woking, Surrey. Tel: 04867 89098

CROSSWORD Companion Commodore 64 Disk Program + 18600 W vocabulary £10. Cheques, P.O.'s to John Tulley, 71 Town Lane, Mobberley, Cheshire, WA16 7HH.

COMMODORE PET 8096, Twin 4040 Drives, 4022 P Printer plus all manuals - Offers. Also CBM 64 plus 1541 plus 1701 Monitor plus 5 Octave Keyboard, plus IEEE 488 plus 3 Cartridges, over 100 disks, 80 tapes - Offers. Telephone: 05827 68253.

SOFTWARE

THE BEST POSSIBLE AMIGA 500 DEAL.

AMIGA 500 ...with FREE Mouse, Mouse Mat, Deluxe paint, Karate Kid II, 10 Disks of Software, 2 Manuals, Amiga Tutorial, 5 Blank Disks and Delivery.
£485 with T.V. Modulator OR **£464** without.
(includes delivery)
★ 25 day replacement (from purchase) of faulty Amiga 500 and/or power unit.
★ One year Full Guarantee *(extendable)*
Access Orders/Enquiries: Tel 0706 43519
RAMSOFT (Dept Y.C.3),
24 Bankfield Lane, Norden, Rochdale, Lancs. OL11 5RJ.

FREE

large (100 disk capacity) disk storage box lockable worth £13.95 -
- When you buy 25disks for only £18.75 (inc. VAT & P/P **OR** *50 disks for only £28.95 inc. Fuji 5¼" D.S. Disks*
Nebulae, Dept MA. FREEPOST, Kilroot Park Industrial Estates, Carrickfergus, Co Antrim. BT38 7BR TEL (09603) 51020

AMIGA
PUBLIC DOMAIN SOFTWARE
We have the very latest Fish # 1 to # 102, and Amicus, 1 # to # 22, disks in stock. For full details of programe content PLUS Tutorial 'PD Without Tears' PLUS the JUMPDISK Magscan PLUS a collection of programs and articles from previous issue of JUMDISK. Please send a £3.50 cheque/PO for the 'JUMPDISK DEMO'. We will send a copy by return.
George Thompson Services,
Dippen Lodge, Dippen, Brodick, Arran, KA27 8RN. Scotland.
Tel. 077 082 234

LANGUAGE

FORTH AND LISP FOR THE C64 AND C128
These languages are available as 16K ROM Cartridges.
S-forth £24.90 S-lisp £32.90
LETCHWORTH SOFTWARE
45 Swift Close, Letchworth, Herts SG6 4LL Tel (0462) 675305

C16/+4 FORTH
Metacompiler to FIG + 79. Auto tape/disc. Savsys, auto start editor. Tape or disc **£24.95**
TENSAL TECHNOLOGY
No 15 Penrice Close, WSM, Avon BS22 9AH

X RATED
ADULTS ONLY GAME
FANTASY
Commodore 64/128 **£6.50**
inc p&p
Available to persons over 18 only. Please state age when ordering.
R'n'H MICROTEC
32 Hazell Way, Stoke Poges, Bucks SL2 4DD.

AMIGA

DIGITAL SHADES LTD

Have moved to larger, completely refurbished premises at:-
UNIT 2, 386-388 GREEN ST.,
UPTON PARK, E13 9AP.
TELEPHONE: 471 7969

★ SPECIAL OFFER ★
AMIGA A500 £450 - with free Mouse, Mouse Mat, 10 Public Domain Disks, Amiga Basic, Amiga Hand-books, Karate Kid II, Deluxe Paint and T.V. Modulator.
(reduced to £435 for first week).

★ ST OFFER ★
ATARI ST £260, with free Mouse, Atari Basic, manual and 5 Public Domain Disks and Software.
(reduced to £250 for the first week).

All prices include VAT. Telephone orders accepted.
Callers Welcome.

AMIGA OWNERS
Generous discounts now available on popular software, Blank Discs, Accessories, etc.
Try Software before you buy.
For details send SAE to:-
THE SOFTWARE CLUB (YC)
26 BEECHLEY DRIVE, CARDIFF CF5 3SN

TO ADVERTISE IN YOUR COMMODORE PHONE JON WATSON ON 01-437 0699

COPY DEADLINES

MARCH
issue 21st DEC

APRIL
issue 26th JAN

MAY
issue 26th FEB.

AMIGA OWNERS!

Interested in *FULL*-Colour Hard Copy?
Send your IFF Format Art on Disk and I will print it out on the 4000+ Colour Xerox 4020 Printer.
All quickly returned 1st class. Specify file to be printed and send £2 per print + 30p P&P to:-

AMIGART,
25 Deanhead Road, Eyemouth, Berwickshire. TD14 5SA.

B A E A K

Serious Users Guide Software

Apologies to anyone who experienced a delay in receiving the software from the Serious Users Guide. This was due to technical difficulties with the disk.

It is possible that some people may have received a corrupted version of this disk. Should your disk not work correctly can you please return it to:

Omega Micro Services,
7 Graham Avenue,
Brinsworth,
Rotherham S60 5LA.

and a replacement will be sent to you.

Commodore Where Are You?

At the *Your Commodore* office we are repeatedly asked for the address and telephone number of Commodore U.K. Many people, after referring to their computer manuals, believe them to be based in Corby.

The Commodore plant at Corby was closed down some time ago. Reproduced here you will find the correct address for Commodore U.K. We suggest that you write this correct address in the front of your computers manual for future reference.

Commodore Business Machine, (UK),
Commodore House,
The Switchback,
Gardner Road,
Maidenhead,
Berks SL6 7XA.

Plus/4 Extended Basic

The author of the Plus/4 Extended Basic program that appeared in our *1987 Serious Users Guide* has provided us with a number of updates to the program. All of the alterations are made to Listing 1. The changes are as follows:

```
86 POKE DEC("13A9"),21
100 SYS 8020"EXTENDED BASIC",
1,4097,8605
```

A number of errors also appeared in the text for this program.

The line to be added should the fast loader be used is:

```
95 IFD$="T"THENSYSDEC
("3D00")
```

The RECORD format is incorrect. This should be:
RECORD CHANNEL,RECORD [OFFSET]

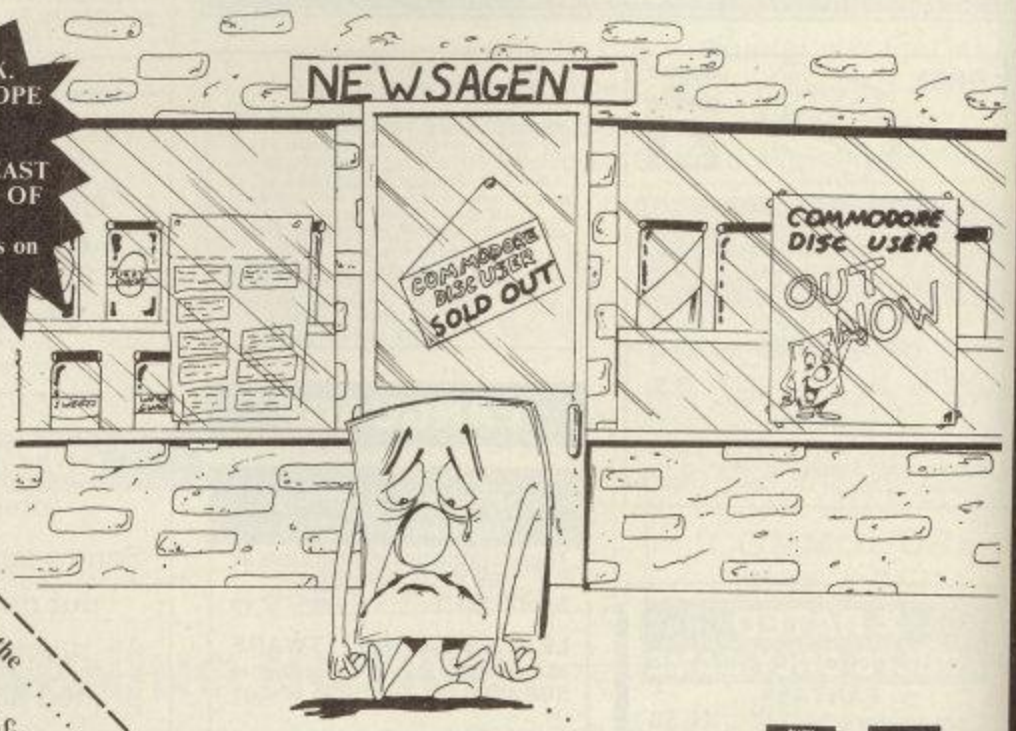
The RECORD command also assumes that file 15 has opened as the command channel.

The DMERGE format is the same as the normal DLOAD command.

KNOW THE FEELING?... SUBSCRIBE TO

COMMODORE *Disk User*

£15.00 for 6 issues U.K.
£18.00 for 6 issues EUROPE
£18.20 for 6 issues MIDDLE EAST
£19.30 for 6 issues FAR EAST
£18.40 for 6 issues REST OF WORLD
Airmail subscription rates on request.



Please begin my subscription(s) to COMMODORE DISK USER with the ..... issue.
I enclose my cheque/postal order for £..... made payable to Argus Specialist Publications Ltd.
or debit £..... from my Access/Barclaycard No. / / / / / / / / / / / / / / / /
valid from ..... to .....
NAME (Mr/Mrs/Miss) .....
ADDRESS .....
.....
Postcode .....
Signature .....
Date .....

Please use BLOCK CAPITALS and include post codes

VISA

Send this form with your remittance to:
INFONET LTD., 5 River Park Estate,
Berkhamsted,
Herts HP4 1HL.

BONE CRUNCHER

Bono takes the skeletons to a cauldron

Bono's partner Fozzy restrains a monster

A PRIZE FOR EVERYONE WHO COMPLETES THE GAME

Buy Bonecruncher and see if you can complete all the game screens!

All successful players will receive a superb portable radio with headphones (illustrated on the right), a colourful Bono's Bathing Co. badge, and a signed certificate.

Closing Date: 30th April, 1988

- Full of Strategic Puzzles and Problems
- Over 20 Increasingly Difficult Caverns
- Password Feature helps you to Progress
- Prize Competition for Skilled Players
- Humorous, Witty, a Barrel of Laughs

Bono The Dragon and his Flourishing Business

You are Bono, a friendly dragon residing in a picturesque sea-castle. As a shrewd business-dragon, keen on "nice little earners", you make your living by selling soap to the giant monsters who bathe in the sea surrounding the castle.

With the aid of your business partner, named Fozzy, you produce the soap by collecting skeletons amongst the castle caverns and then boiling the bones in a cauldron.

However, the castle caverns are fraught with danger: there are monsters who will kill you, spiders who will eat you alive, and glooks who will block your path. It will pay you dividends to also avoid the perilous trapdoors and hidden volcanoes.

A soap-opera not to be missed!

COMMODORE 64/128 • COMMODORE AMIGA
BBC MICRO • ACORN ELECTRON

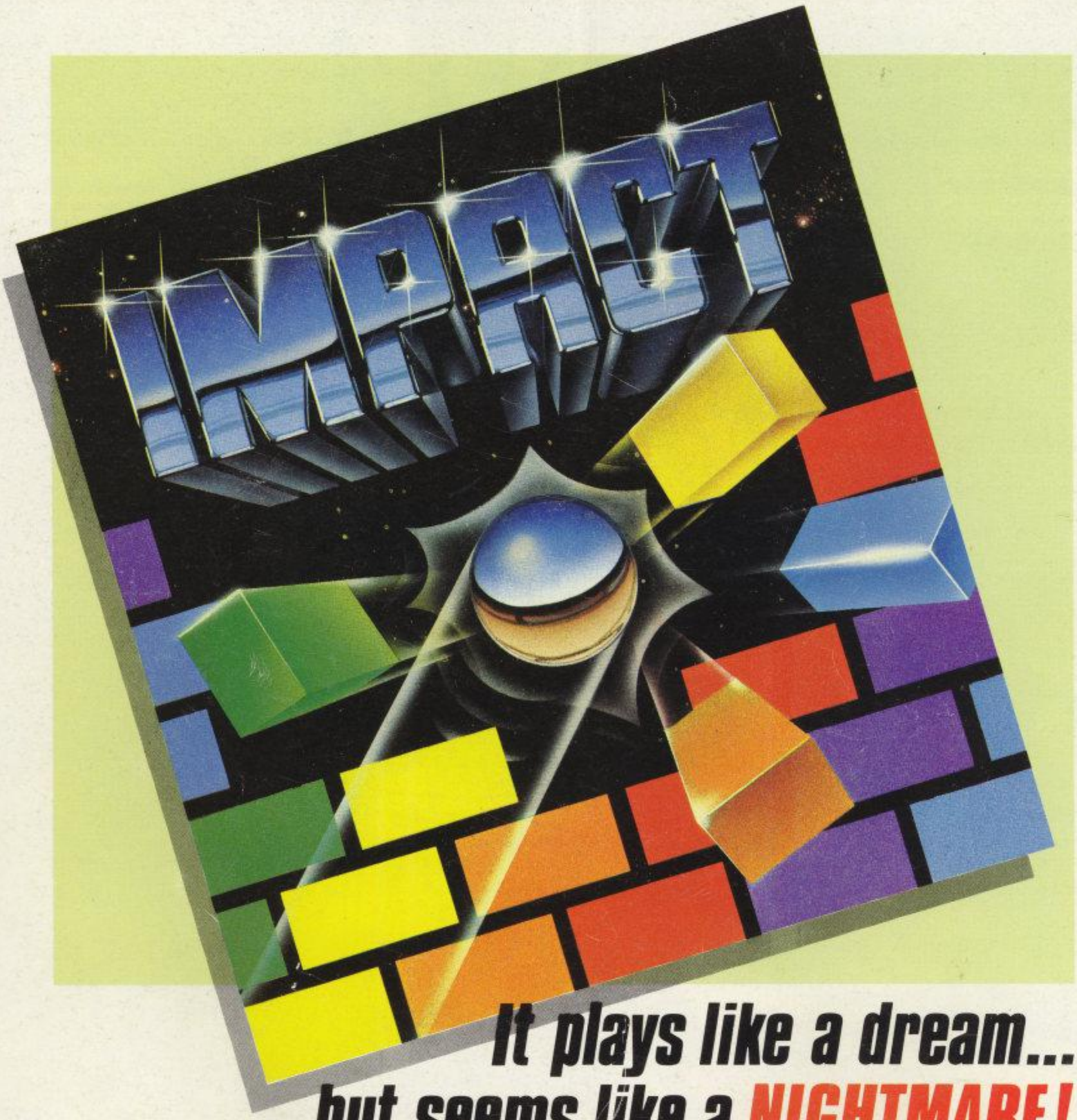
Cassettes: **£9.95** (C64, BBC, Electron)
5¼" Discs: **£11.95** (C64, BBC, Electron)
3½" Discs: **£14.95** (Amiga, BBC Master Compact)

SUPERIOR SOFTWARE Limited
Dept. BC2, Regent House, Skinner Lane,
Leeds LS7 1AX.
Telephone: (0532) 459453

24-HOUR TELEPHONE
ANSWERING SERVICE FOR ORDERS

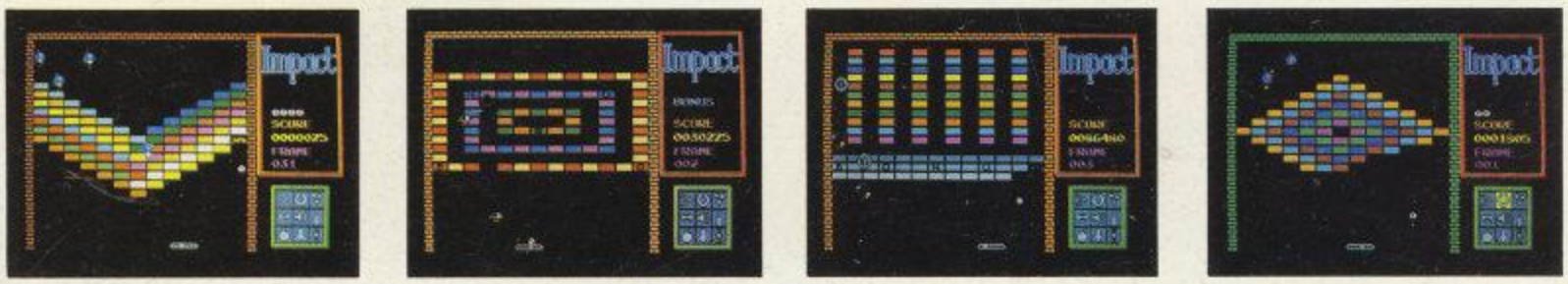
OUR GUARANTEE

- All mail orders are despatched within 24 hours by first-class post.
- Postage and packing is free.
- Faulty cassettes and discs will be replaced immediately.
(This does not affect your statutory rights).



It plays like a dream... but seems like a NIGHTMARE!

TRAPPED – *in a 1970's arcade machine! Every escape route is blocked by a wall of brightly coloured bricks. Powerfully addictive, with 200k of digitized sound,* **IMPACT** *has 80 built in screens plus 48 that you can design yourself – as hard, as simple, as much fun as you like. Hidden on each screen are special tokens – catch them if you can. Use them to buy one of nine powerful weapons, or keep them until the end of the screen to score a bonus.*



Available now, price £14.95 for Amiga (512k min.) and Atari ST (requires 512k, mouse and colour monitor or TV).
Now released for CBM64, Spectrum and BBC (specifications vary).
Audiogenic Software ltd., Winchester House, Canning Road, Wealdstone, Harrow, Middlesex HA3 7SJ.

VISA

☎ **Tel: 01-861 1166**

s like a dream...
ke a NIGHTMARE!

route is blocked by a wall of brightly
gitized sound, **IMPACT** has 80 built in
, as simple, as much fun as you like.
if you can. Use them to buy one of nine
screen to score a bonus.

(requires 512k, mouse and colour monitor or TV).
ary).
ealdstone,

6

Your Commodore January 1988

Volume 4 Number 4

YOUR COMMOD

AN ARGUS SPECIALIST PUBLICATION

YOUR AMIGA
FREE 32 PAGE SUPPLEMENT

C64 TAPE SYSTEM—FIND PR

ACKROYD'S SAGA—EDUCATIONAL GAME
CONTROLLING THE C128's 80 COLUMNS